TEKTRONIX®

7A26
DUAL TRACE
AMPLIFIER

INSTRUCTION MANUAL

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070-1484-00

Serial Number B085094

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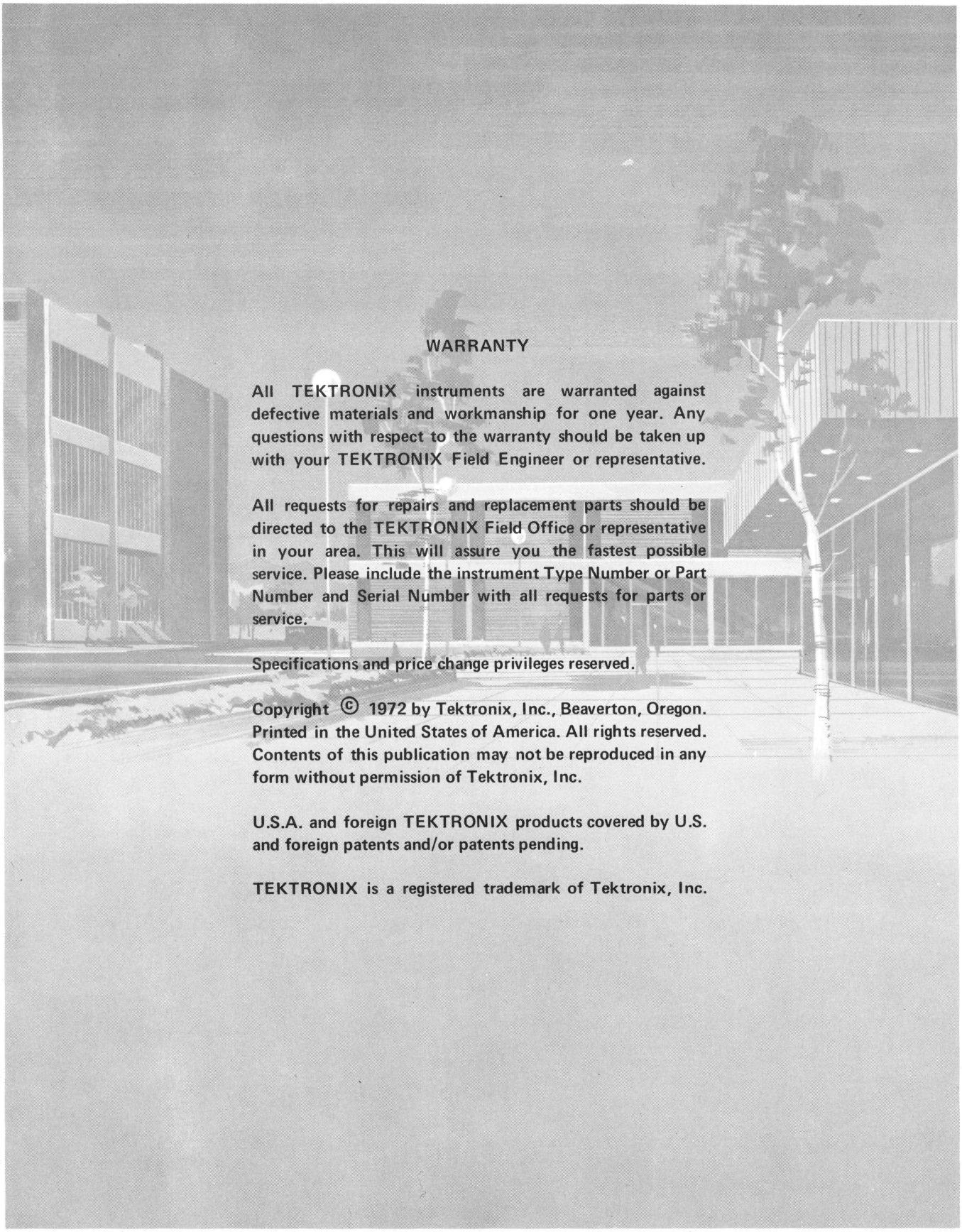

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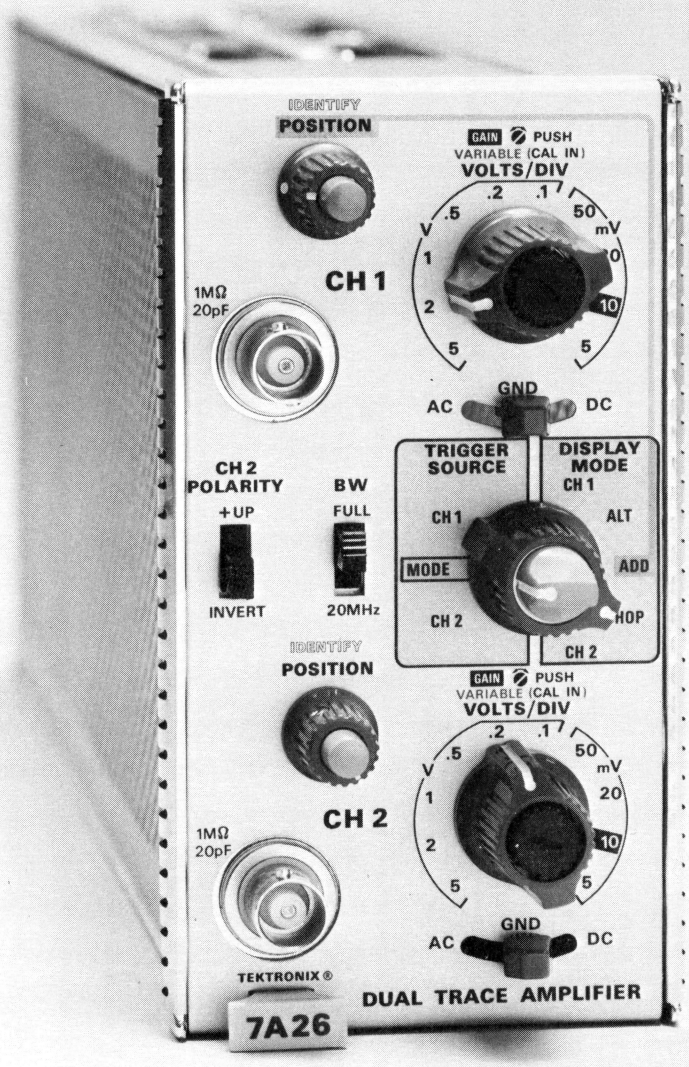


Fig. 1-1. 7A26 Dual Trace Amplifier.

OPERATING INSTRUCTIONS

7A26 Features

The 7A26 Dual Trace Amplifier plug-in unit is designed for use with TEKTRONIX 7000-Series Oscilloscopes. The 7A26 is a dual-channel wide-bandwidth amplifier. Internal gain and compensation circuits are automatically switched to correspond to the setting of the VOLTS/DIV switch. Channel 2 can be inverted for differential measurements.

PRELIMINARY INFORMATION

Installation

The 7A26 is calibrated and ready for use as received. It can be installed in any compartment of TEKTRONIX 7000-series oscilloscopes, but is intended for principal use in vertical plug-in compartments. To install, align the upper and lower rails of the 7A26 with the oscilloscope tracks and fully insert it. The front will be flush with the front of the oscilloscope when the 7A26 is fully inserted, and the latch at the bottom-left corner of the 7A26 will be in place against the front panel. See Fig. 1-2.

To remove the 7A26, pull on the latch (which is inscribed with the unit identification "7A26") and the 7A26 will unlatch. Continue pulling on the latch to slide the 7A26 out of the oscilloscope.

GENERAL OPERATING INFORMATION

Introduction

For single-trace operation, either of the two identical amplifier channels can be used independently by setting the DISPLAY MODE and TRIGGER SOURCE switches to CH 1 or CH 2 and connecting the signal to be observed to the appropriate input. In the discussions to follow, single-trace operations using CH 1 only apply equally to CH 2 only.

Signal Connections

In general, probes offer the most convenient means of connecting a signal to the input of the 7A26. A 10X attenuation probe offers a high input impedance and allows the circuit under test to perform very close to normal operating conditions.

Any TEKTRONIX probe, with a readout coding ring can be used with TEKTRONIX 7A-series amplifier units equipped with readout. The readout coding ring on the probe connects to a circuit in the amplifier unit which automatically corrects the readout displayed on the CRT to the actual deflection factor at the tip of the probe being used. For probes to be used with amplifier units with or without readout, see the Tektronix, Inc. catalog.

Vertical Gain Check and Adjustment

To check the gain of either channel, set the VOLTS/DIV switch to 10 mV and connect 40 millivolts, 1 kilohertz signal from the oscilloscope calibrator to the input connector of the channel being checked. The vertical deflection should be exactly four divisions. If not, adjust the front-panel GAIN for exactly four divisions of deflection. The GAIN adjustment is engaged by pressing in the GAIN control knob and turning the knob with a narrow-blade screwdriver (see Fig. 1-3 Front Panel Controls and Connectors). Turn the knob clockwise, then counter-clockwise, until the GAIN control is engaged. When the GAIN control is engaged, the vertical deflection will change as the knob is turned. Turn the GAIN control knob with the screwdriver until the deflection is set to exactly four divisions, then remove the screwdriver.

Input Coupling

The Channel 1 and Channel 2 coupling (AC-GND-DC) switches allow a choice of input coupling methods. The type of display desired and the applied signal will determine the coupling to use.

The DC coupling position must be used to display the DC component of the signal. It must also be used to display AC signals below about 30 hertz (ten hertz with a 10X probe) and square waves with low-frequency components as these signals are attenuated in the AC position.

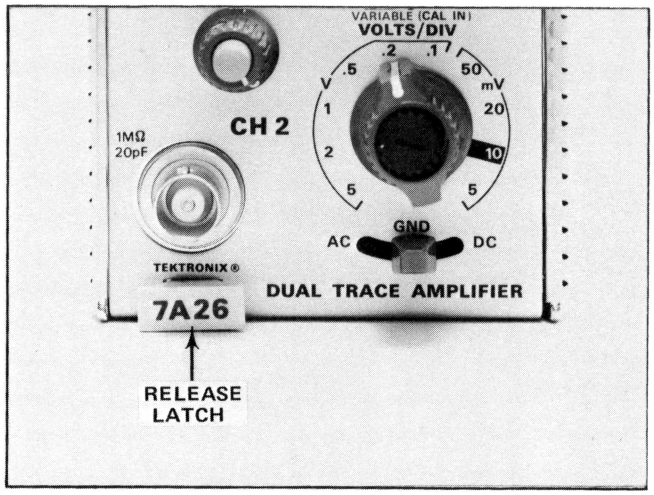


Fig. 1-2. Release latch.

CH 1 POSITION

Controls position of the CH 1 trace and "ADD" display mode trace.

CH 1 Input Connector

Provides signal connection to CH 1.

CH 2 POLARITY

Provides means of inverting the CH 2 display.

BANDWIDTH Switch

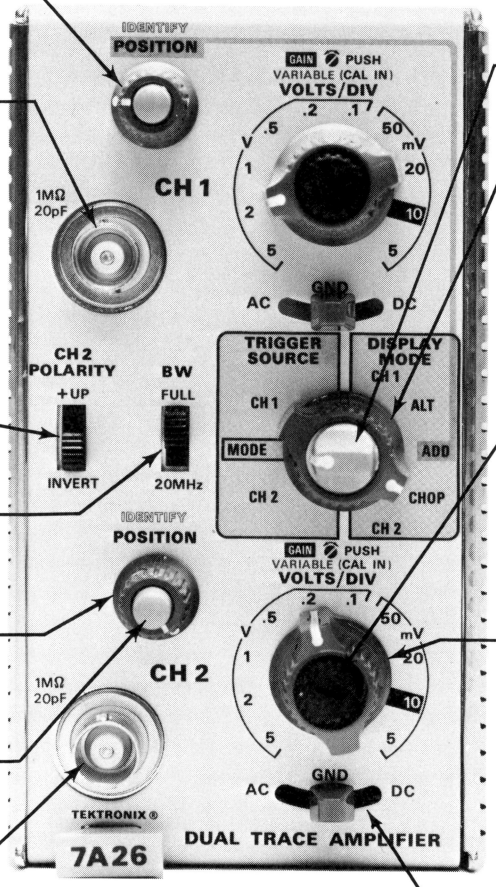
Provides a means of limiting the upper bandwidth.

CH 2 POSITION

Controls position of the CH 2 trace only (disabled in ADD).

IDENTIFY (Same as CH 1)

Deflects trace about 0.2 division for trace identification. In instruments with Readout, also replaces readout with the word "IDENTIFY".



TRIGGER SOURCE

Selects source of the trigger signal.

DISPLAY MODE

Selects the mode of operation.

VARIABLE VOLTS/DIV (same as CH 1)

Provides continuously variable uncalibrated settings between calibrated steps.

GAIN Adjustment

When the VARIABLE control is pushed in, it becomes a front panel screwdriver adjustment for calibration of deflection factor.

VOLTS/DIV (same as Ch 1)

Selects calibrated deflection factors from 5 mV/Div to 5 V/Div; ten steps in a 1-2-5 sequence.

CH 2 Input Connector

Provides signal connection to Ch 2.

AC-GND-DC (same as CH 1)

Selects signal input coupling mode.

Fig. 1-3. 7A26 front-panel controls and connectors.

In the AC coupling position, the DC component of the signal is blocked by a capacitor in the input circuit. The AC coupling position provides the best display of signals with a DC component much larger than the AC components. The precharge feature should be used with large DC inputs. To use this feature, first set the coupling to GND. Connect the probe to the circuit and wait about two seconds for the coupling capacitor to charge. Then set the coupling to AC.

The GND position provides a ground reference at the input of the amplifier without externally grounding the input connectors. However, the signals connected to the inputs are not grounded, and the same DC load is presented to the signal source.

VOLTS/DIV and VARIABLE Controls

The amount of vertical deflection produced by a signal is determined by the signal amplitude, the attenuation factor of the probe, the setting of the VOLTS/DIV switch, and the setting of the VARIABLE control. Calibration deflection factors indicated by the settings of the VOLTS/DIV switch apply only when the VARIABLE control is in the calibrated (CAL IN) position.

The VARIABLE control provides variable, uncalibrated settings between the calibrated steps of the VOLTS/DIV switch. With the VARIABLE control fully counterclockwise and the VOLTS/DIV set to 5 volts/division the uncalibrated vertical deflection factor is extended to at least 12.5 volts/division. By applying a calibrated voltage source to the input connector, any specific deflection factor can be set within the range of the VARIABLE control.

CH 2 POLARITY Switch

The CH 2 POLARITY switch may be used to invert the displayed waveform of the signal applied to the CH 2 input. This is particularly useful in added operation of the 7A26 when differential measurements are to be made. The CH 2 POLARITY switch has two positions, +UP and INVERT. In the +UP position, the displayed waveform will have the same polarity as the applied signal and a positive DC voltage will move the CRT trace up. In the INVERT position, a positive-going waveform at the CH 2 input will be displayed on the CRT in inverted form and a positive DC voltage will move the trace down.

DISPLAY MODE Switch

For single-trace operation, apply the signal either to the CH 1 input or the CH 2 input and set the DISPLAY MODE switch to the corresponding position: CH 1 or CH 2.

To display a signal in one channel independently when a signal is also applied to the other channel, simply select the desired channel by setting the DISPLAY MODE switch to the appropriate CH 1 or CH 2 position.

Alternate Mode. The ALT position of the DISPLAY MODE switch produces a display which alternates between channel 1 and channel 2 with each sweep on the CRT. Although the ALT mode can be used at all sweep rates, the CHOP mode provides a more satisfactory display at sweep rates below about 0.5 millisecond/division. At slow sweep rates alternate mode switching becomes visually perceptible.

Add Mode. The ADD position of the DISPLAY MODE switch can be used to display the sum or difference of two signals, for common-mode rejection to remove an undesired signal, or for DC offset (applying a DC voltage to one channel to offset the DC component of a signal on the other channel). The overall deflection factor in the ADD mode with both VOLTS/DIV switches set to the same position is the deflection factor indicated by either VOLTS/DIV switch. However, if the CH 1 and CH 2 VOLTS/DIV switches are set to different deflection factors, the resultant amplitude is difficult to determine from the CRT display. In this case, the voltage amplitude of the resultant display can be determined accurately only if the amplitude of the signal applied to one channel is known. In the ADD mode, positioning of the trace is controlled by the channel 1 POSITION control only.

Chop Mode. The CHOP position of the DISPLAY MODE switch produces a display which is electronically switched between channels at approximately a 500 kilohertz rate (controlled by mainframe). In general the CHOP mode provides the best display at sweep rates slower than about 0.5 millisecond/division or whenever dual-trace, non-repetitive phenomena is to be displayed.

TRIGGER SOURCE Switch

CH 1. The CH 1 position of the TRIGGER SOURCE switch provides a trigger signal obtained from the signal applied to the CH 1 input connector. This provides a stable display of the signal applied to the CH 1 input connector.

CH 2. The CH 2 position of the TRIGGER SOURCE switch provides a trigger signal obtained from the signal applied to the CH 2 input connector. This provides a stable display of the signal applied to the CH 2 input connector.

MODE. In this position of the TRIGGER SOURCE switch, the trigger signal for the time-base unit is dependent on the setting of the DISPLAY MODE switch. The trigger

source for each position of the DISPLAY MODE switch is as follows:

MODE	TRIGGER SIGNAL SOURCE
CH 1	Channel 1
CH 2	Channel 2
ADD	Algebraic sum of channel 1 and channel 2
CHOP	Algebraic sum of channel 1 and channel 2
ALT	Alternates between channel 1 and channel 2

Trace Identification

When the IDENTIFY button is pressed, the trace is deflected about 0.2 division to identify the 7A26 trace. This feature is particularly useful when multiple traces are displayed. When the IDENTIFY button is pressed on instruments with readout, the deflection factor readout is replaced with the word "IDENTIFY".

BW Switch

Provides a means of limiting the upper bandwidth. FULL: Allows the 7A26 to operate at full bandwidth. 20 MHz: Reduces the upper bandwidth of the 7A26 to about 20 megahertz.

BASIC APPLICATIONS

General

The following information describes the procedures and techniques for making basic measurements with a 7A26 and the associated TEKTRONIX oscilloscope and time-base. These applications are not described in detail since each application must be adapted to the requirements of the individual measurements. This instrument can also be used for many applications not described in this manual. Contact your local TEKTRONIX Field Office or representative for assistance in making specific measurements with this instrument.

Peak-to-Peak Voltage Measurements (AC)

To make peak-to-peak voltage measurements, use the following procedure:

1. Apply the signal to either input connector.

2. Set the DISPLAY MODE and TRIGGER SOURCE switches to display the channel used.

3. Set the coupling switch to AC.

NOTE

For low-frequency signals below about 30 hertz use the DC position to prevent attenuation of the signal.

4. Set the VOLTS/DIV switch to display about five divisions of the waveform vertically.

5. Set the time-base Triggering controls for a stable display. Set the time-base unit to a sweep rate which displays several cycles of the waveform.

6. Turn the 7A26 POSITION control so the lower portion of the waveform coincides with one of the graticule lines below the center horizontal line, and the top of the waveform is within the viewing area. With the time-base Position control, move the display so one of the upper peaks lies near the center vertical line (see Fig. 1-4).

7. Measure the divisions of vertical deflection peak-to-peak. Check that the VARIABLE (VOLTS/DIV) control is in the CAL IN position.

NOTE

This technique can also be used to make measurements between two points on the waveform, rather than peak to peak.

8. Multiply the deflection measured in step 7 by the VOLTS/DIV switch setting. Include the attenuation factor of the probe if used.

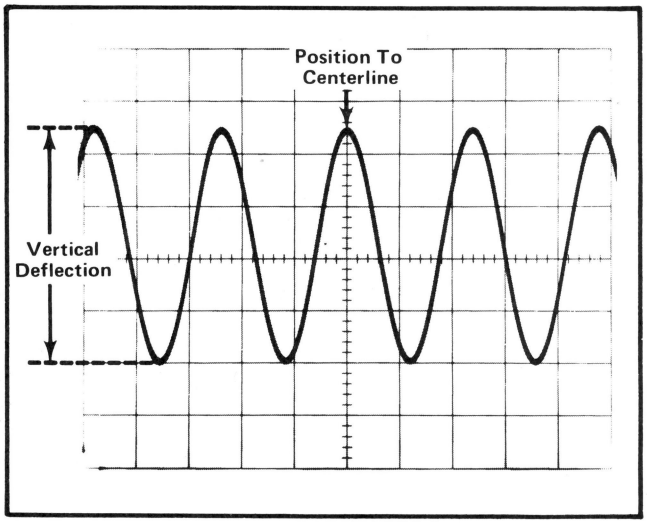


Fig. 1-4. Measuring the peak-to-peak voltage of a waveform.

EXAMPLE: Assume that the peak to peak vertical deflection is 4.5 divisions (see Fig. 1-4) using a 10X attenuator probe, and the VOLTS/DIV switch is set to 1 V.

$$\text{Volts Peak to Peak} = \text{vertical deflection (divisions)} \times \text{VOLTS/DIV setting} \times \text{probe attenuation factor}$$

Substituting the given values:

$$\text{Volts Peak-to-Peak} = 4.5 \times 1 \times 10$$

The peak-to-peak voltage is 45 volts.

Instantaneous Voltage Measurements (DC)

To measure the DC level at a given point on a waveform, proceed as follows:

1. Connect the signal to either input connector.

2. Set the DISPLAY MODE and TRIGGER SOURCE switches to display the channel used.

3. Set the VOLTS/DIV switch to display about five divisions of the waveform.

4. Set the coupling switch to GND and position the trace to the bottom graticule line or other reference line. If the voltage is negative with respect to ground, position the trace to the top graticule line. Do not move the POSITION control after this reference line has been established.

NOTE

To measure a voltage level with respect to a voltage other than ground, make the following changes to step 4. Set the coupling switch to DC and apply the reference voltage to the input connector. Then position the trace to the reference line.

5. Set the coupling switch to DC. The ground reference line can be checked at any time by switching to the GND position.

6. Set the time-base Triggering controls for a stable display. Set the time-base sweep rate for an optimum display of the waveform.

7. Measure the distance in divisions between the reference line and the point on the waveform at which the DC level is to be measured. For example, in Fig. 1-5 the measurement is between the reference line and point A.

8. Establish the polarity of the waveform. With the CH 2 POLARITY switch in the +UP position, any point above the reference line is positive.

9. Multiply the distance measured in step 7 by the VOLTS/DIV setting. Include the attenuation factor of the probe, if used.

EXAMPLE: Assume the vertical distance measured is 3.6 divisions (see Fig. 1-5) and the waveform is above the reference line using a 10X probe with a VOLTS/DIV setting of 0.5 V.

Using the formula:

$$\text{Instantaneous Voltage} = \text{vertical distance (divisions)} \times \text{polarity} \times \text{VOLTS/DIV setting} \times \text{probe attenuation factor}$$

Substituting the given values:

$$\text{Instantaneous Voltage} = 3.6 \times +1 \times 0.5\ \text{V} \times 10$$

The instantaneous voltage is 18 volts.

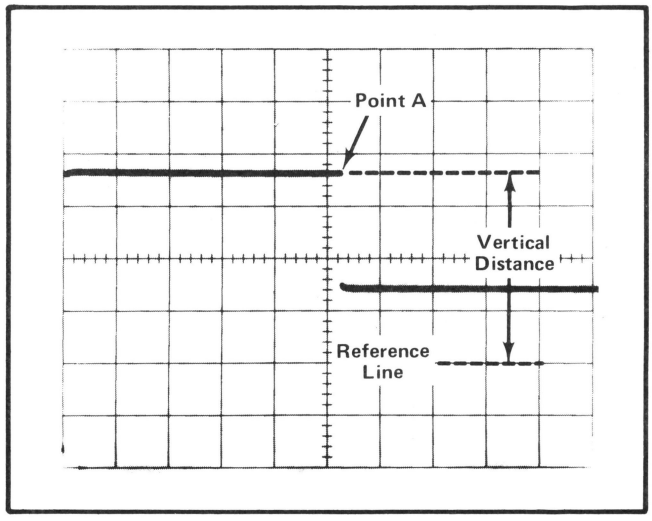


Fig. 1-5. Measuring instantaneous voltage with respect to some reference.

Comparison Measurements

In some applications it may be desirable to establish arbitrary units of measurement other than those indicated by the VOLTS/DIV switch. This is particularly useful when comparing unknown signals to a reference amplitude. One use for the comparison-measurement technique is to facilitate calibration of equipment where the desired amplitude does not produce an exact number of divisions of deflection. The adjustment will be easier and more accurate if arbitrary units of measurement are established so that the correct adjustment is indicated by an exact number of divisions of deflection. The following procedure describes how to establish arbitrary units of measure for comparison measurements.

To establish an arbitrary vertical deflection factor based upon a specific reference amplitude, proceed as follows:

1. Connect the reference signal to the input connector. Set the time-base unit sweep rate to display several cycles of the signal.

2. Set the VOLTS/DIV switch and the VARIABLE control to produce a display which is an exact number of vertical divisions in amplitude. Do not change the VARIABLE control after obtaining the desired deflection.

3. To establish an arbitrary vertical deflection factor so the amplitude of an unknown signal can be measured accurately at any setting of the VOLTS/DIV switch, the amplitude of the reference signal must be known. If it is not known, it can be measured before the VARIABLE VOLTS/DIV control is set in step 2.

4. Divide the amplitude of the reference signal (volts) by the product of the vertical deflection (divisions) established in step 2 and the setting of the VOLTS/DIV switch. This is the vertical conversion factor.

$$\text{Vertical Conversion Factor} = \frac{\text{reference signal amplitude (volts)}}{\text{vertical deflection (divisions)} \times \text{VOLTS/DIV switch setting}}$$

5. To measure the amplitude of an unknown signal, disconnect the reference signal and connect the unknown signal to the input connector. Set the VOLTS/DIV switch to a setting that provides sufficient vertical deflection to make an accurate measurement. Do not readjust the VARIABLE control.

6. Measure the vertical deflection in divisions and calculate the amplitude of the unknown signal using the following formula.

$$\text{Signal Amplitude} = \text{VOLTS/DIV setting} \times \text{vertical conversion factor} \times \text{vertical deflection (divisions)}$$

EXAMPLE: Assume a reference signal amplitude of 30 volts, a VOLTS/DIV setting of 5 V and the VARIABLE control adjusted to provide a vertical deflection of four divisions. Substituting these values in the vertical conversion factor formula (step 4):

$$\text{Vertical Conversion Factor} = \frac{30\ \text{V}}{4 \times 5\ \text{V}} = 1.5$$

Then with a VOLTS/DIV setting of 2 V, the peak-to-peak amplitude of an unknown signal which produces a vertical deflection of five divisions can be determined by using the signal amplitude formula (step 6):

$$\text{Signal Amplitude} = 2\ \text{V} \times 1.5 \times 5 = 15\ \text{volts}$$

Dual-Trace Phase Difference Measurements

Phase comparison between two signals of the same frequency can be made using the dual-trace feature of the 7A26. This method of phase difference measurement can be used up to the frequency limit of the oscilloscope system. To make the comparison, use the following procedure:

1. Set the CH 1 and CH 2 coupling switches to the same position, depending on the type of coupling desired.

2. Set the DISPLAY MODE to ALT or CHOP. In general, CHOP is more suitable for low frequencies and ALT is more suitable for high frequencies. Set the TRIGGER SOURCE to CH 1.

3. Connect the reference signal to the CH 1 input and the comparison signal to the CH 2 input. Use coaxial cables or probes which have similar time delay characteristics to connect the signals to the input connectors.

4. If the signals are of opposite polarity, set the CH 2 POLARITY switch to invert the channel 2 display. (Signals may be of opposite polarity due to 180° phase difference; if so, take this into account in the final calculation.)

5. Set the VOLTS/DIV switches and the VARIABLE controls of the two channels so the displays are equal and about five divisions in amplitude.

6. Set the time-base unit to a sweep rate which displays about one cycle of the waveforms. Set the Triggering controls for a stable display.

7. Center the waveforms on the graticule with the 7A26 POSITION controls.

8. Adjust the time-base Variable Time/Div control until one cycle of the reference signal occupies exactly eight horizontal divisions between the second and tenth vertical lines of the graticule (see Fig. 1-6). Each division of the graticule represents 45° of the cycle (360° ÷ 8 divisions = 45°/division). The sweep rate can now be stated in terms of degrees as 45°/division.

9. Measure the horizontal difference between corresponding points on the waveform.

10. Multiply the measured distance (in divisions) by 45°/division to obtain the exact amount of phase difference.

EXAMPLE: Assume a horizontal difference of 0.3 division with a sweep rate of 45°/division as shown in Fig. 1-6.

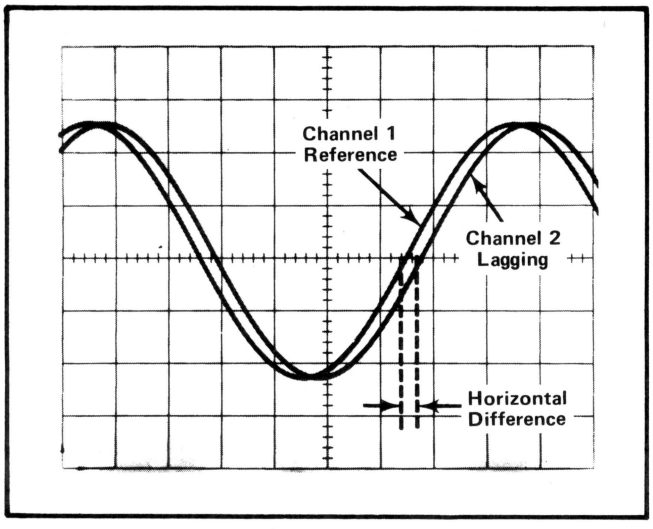


Fig. 1-6. Measuring phase difference between two signals.

Using the formula:

$$\text{Phase Difference} = \text{horizontal difference (divisions)} \times \text{sweep rate (degrees/division)}$$

Substituting the given values:

$$\text{Phase Difference} = 0.3 \times 45^\circ$$

The phase difference is 13.5°.

High Resolution Phase Measurements

More accurate dual-trace phase measurements can be made by increasing the sweep rate (without changing the Variable Time/Div control). One of the easiest ways to increase the sweep rate is with the time-base Magnifier switch. Set the Magnifier to X10 and determine the magnified sweep rate by dividing the sweep rate obtained previously by the amount of sweep magnification.

EXAMPLE: If the sweep rate is increased 10 times by the Magnifier, the magnified sweep rate is 45°/division ÷10 = 4.5°/division. Fig. 1-7 shows the same signals as used in Fig. 1-6 but with the Magnifier set to X10. With a horizontal difference of 3 divisions, the phase difference is:

$$\text{Phase Difference} = \text{horizontal difference (divisions)} \times \text{magnified sweep rate (degrees/division)}$$

Substituting the given values:

$$\text{Phase Difference} = 3 \times 4.5^\circ$$

The phase difference is 13.5°.

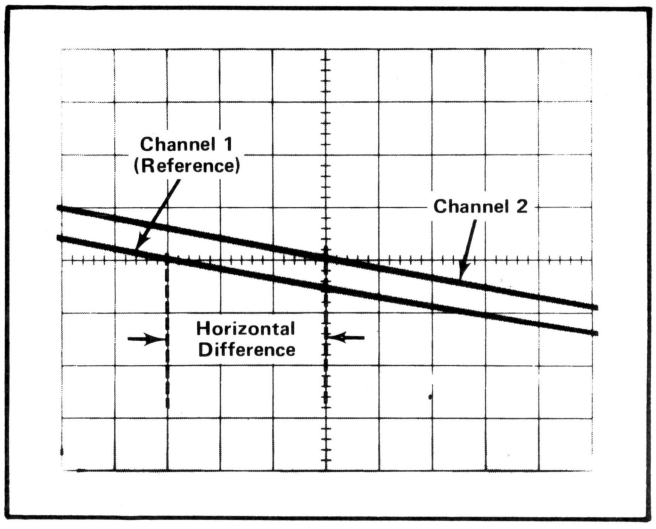


Fig. 1-7. High resolution phase measurement using time-base magnifier.

Common Mode Rejection

The ADD feature of the 7A26 can be used to display signals which contain undesirable components. These undesirable components can be eliminated through common-mode rejection. The procedure is as follows:

1. Set the DISPLAY MODE switch to ALT or CHOP and the TRIGGER SOURCE switch to MODE.

2. Connect the signal containing both the desired and undesired information to the CH 1 input connector.

3. Connect a signal similar to the unwanted portion of the CH 1 signal to the CH 2 input connector. For example, in Fig. 1-8 a line-frequency signal is connected to Channel 2 to cancel out the line-frequency component of the Channel 1 signal.

4. Set both coupling switches to the same setting, DC or AC, depending on the applied signal.

5. Set the VOLTS/DIV switches so the signals are about equal in amplitude.

6. Set the DISPLAY MODE switch to ADD. Set the CH 2 POLARITY switch to INVERT so the common-mode signals are of opposite polarity.

7. Adjust the Channel 2 VOLTS/DIV switch and VARIABLE control for maximum cancellation of the common-mode signal. The signal which remains should be only the desired portion of the channel 1 signal.

EXAMPLE: An example of this mode of operation is shown in Fig. 1-8. The signal applied to Channel 1 contains unwanted line frequency components (Fig. 1-8A). A corresponding line frequency signal is connected to Channel 2 (Fig. 1-8B). Fig. 1-8C shows the desired portion of the signal as displayed when common-mode rejection is used.

The above procedure can also be used for examining a signal superimposed on some DC level when DC coupling is used. A DC voltage of the proper polarity applied to Channel 2 can be used to cancel out the DC portion of the signal applied to Channel 1.

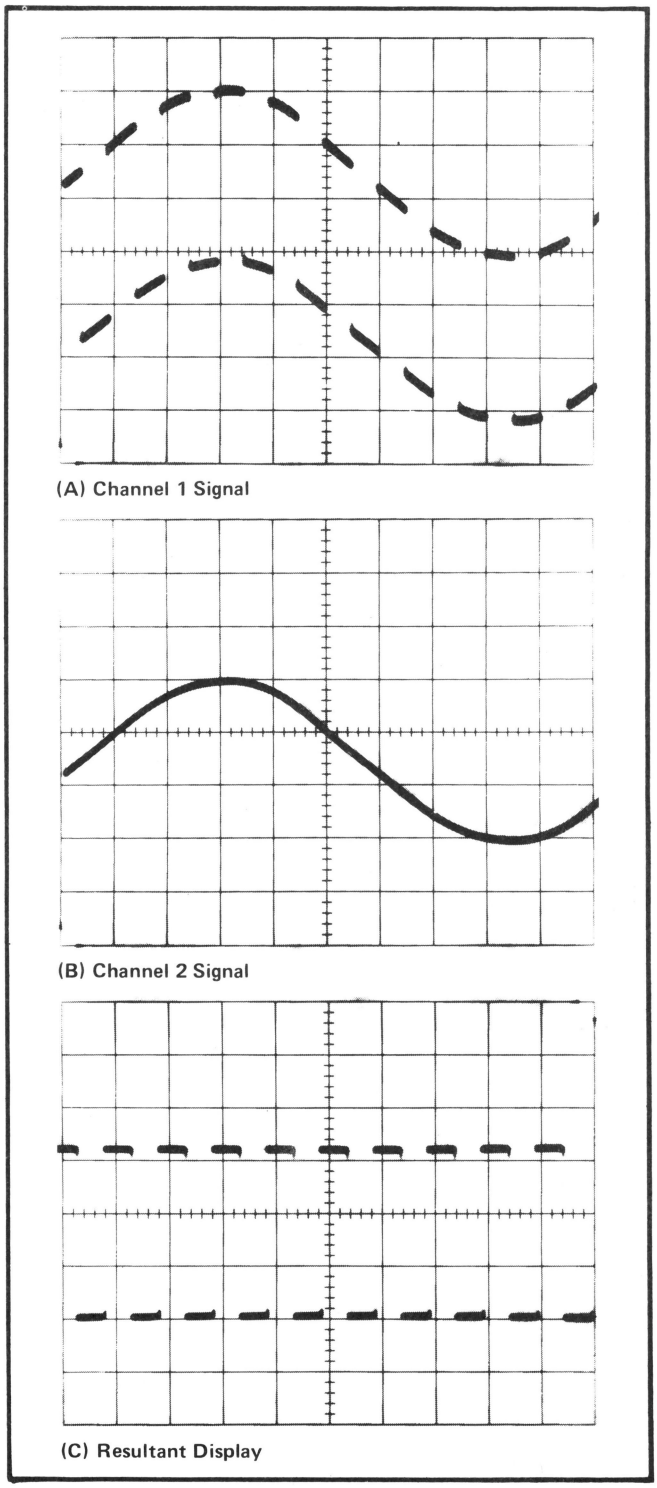


Fig. 1-8. Using the ADD mode for common-mode rejection. (A) Channel 1 signal contains desired information along with line-frequency component. (B) Channel 2 contains line frequency only. (C) Resultant CRT display using common-mode rejection.

SPECIFICATION

Introduction

The following electrical characteristics are valid over the stated environmental range for instruments calibrated at an ambient temperature of +20°C to +30°C, and after a five-minute warmup unless otherwise noted.

TABLE 2-1

Electrical

Characteristic	Performance Requirement	Supplemental Information
Deflection Factor		
Calibrated Range	5 mV/Div to 5 V/Div; ten steps in a 1,2,5 sequence.	Aberrations; 5 mV and 10 mV. +40%, –4.0%, total not to exceed 6% P-P; 20 mV to 5 V, not to exceed 8%.
Deflection Factor Accuracy	Within 2% with GAIN adjusted at 10 mV/Div.	
Uncalibrated (VARIABLE)		Continuously variable between calibrated steps; extends deflection factor to at least 12.5 volts per division.
GAIN Range		Permits adjustment of deflection factor for calibrated operation with all 7000-series oscilloscopes.
Frequency Response		
Upper Bandwidth	Depends upon oscilloscope used.	See the oscilloscope mainframe specifications or the current Tektronix, Inc. catalog.
Lower Bandwidth (AC coupled)	10 hertz or less.	
20 MHz Bandwidth		20 MHz, ±3 MHz.
Risetime		21 ns maximum.
Maximum Input Voltage		
DC Coupled		250 volts, (DC + Peak AC); AC component 500 volts peak-to-peak maximum, one kilohertz or less.
AC Coupled		500 volts, (DC + Peak AC); AC component 500 volts peak-to-peak maximum, one kilohertz or less.
Channel Isolation		50:1 display ratio up to 200 megahertz.
Input R and C		
Resistance		One megohm within 2%.
Capacitance		Approximately 20 picofarads.
Overdrive Recovery Time		0.1 ms or less to recover to within one division after removal of overdrive signal of up to +75 divisions or –75 divisions regardless of overdrive signal duration.

TABLE 2-1 (cont)

Characteristic	Performance Requirement	Supplemental Information
Delay Time Difference Between Channels		200 picoseconds or less.
Common Mode Rejection Ratio	At least 10:1, DC to 50 MHz.	
Display Modes	Channel 1 only.	
	Dual-trace, alternate between channels.	
	Added algebraically.	
	Dual-trace chopped between channels.	
	Channel 2 trace only.	
Trigger Source Selection	Channel 1 only.	
	Follows DISPLAY MODE selection.	
	Channel 2 only.	

TABLE 2-2

Environmental Characteristic

	Refer to the specification for the associated mainframe.

TABLE 2-3

Physical

	Size	Fits all 7000-series plug-in compartments.
	Weight	2 Pounds 9 Ounces (1.2 kilograms).

THEORY OF OPERATION

Introduction

This section of the manual contains a description of the circuitry used in the 7A26 amplifier. The 7A26 description begins with a discussion of the instrument using the block diagram shown in the Diagrams section. Then, each circuit is described in detail using the block diagram to show the interconnections between stages in each major circuit and the relationship of the front-panel controls to the individual stages.

Complete schematics of each circuit are given in the Diagrams section. Refer to these schematics throughout the following circuit description for electrical values and relationship.

BLOCK DIAGRAM

The Channel 1 Amplifier circuit provides gain setting, variable gain control, and trace positioning. The Channel 2 Amplifier provides signal polarity inversion in addition to gain setting, variable gain control, and trace positioning.

The signal to be displayed on the CRT is applied to the CH 1 or CH 2 INPUT connector. The signal passes through the input coupling switch, where the appropriate coupling is selected, to the attenuators. The VOLTS/DIV switch selects the correct amount of attenuation and the signal is passed to the Input Source Follower.

When the VOLTS/DIV switch is set to the 5 mV and 10 mV positions, the signal connected to the INPUT connector is passed through the attenuators without attenuation. When the VOLTS/DIV switch is set in the 5 mV position, the 2X Gain Amplifier operates at full gain. In all other positions of the VOLTS/DIV switch, the 2X Gain Amplifier's gain is reduced by two. Internal gain and balance adjustments are included in the 2X Amplifier.

Overall GAIN and VARIABLE gain is adjusted in the Gain Amplifier. Variable Balance and high frequency adjustments are also controlled in the Gain Amplifier. The output of the Gain Amplifier is connected to the Positioning circuitry where the POSITION and IDENTIFY functions are controlled. Channel 2 is identical to Channel 1, with the exception of the polarity inversion function in Channel 2.

The Display and Trigger Channel switch amplifiers provide differential signal outputs for the signal and trigger lines, from each channel, to a common display and trigger output. This stage also contains a bandwidth limiter that limits the upper frequency response to 20 megahertz.

The output of the Display and Trigger Channel switch Amplifier is connected to the oscilloscope mainframe via the interface connector.

Readout encoding circuitry used in the 7A26 is standard to the 7000-series.

DETAILED CIRCUIT DESCRIPTION

NOTE

The CH 1 and CH 2 amplifier circuits are identical with the exception of the CH 2 GAIN stage U2450, which includes a POLARITY inverting circuit. Only CH 1 is described in detail throughout this discussion.

AC-GND-DC Switch

Input signals connected to the INPUT connectors can be AC-coupled, DC-coupled, or internally disconnected. S100A is a cam-type switch; a contact-closure chart showing the operation is given on the schematic diagrams. When the AC-GND-DC switch is in the DC position, the INPUT signal is connected directly to the attenuators. In the AC position, the INPUT signal passes through capacitor C10. The capacitor prevents the DC component of the signal from passing to the amplifier. The GND position opens the signal path and connects the input circuit of the amplifier to ground. This provides a ground reference without the need to disconnect the applied signal from the INPUT connector. Resistor R102, connected across the AC-GND-DC switch, allows C10 to be pre-charged in the GND position.

Input Attenuator

The effective overall deflection factor of the 7A26 is determined by the setting of the VOLTS/DIV switch, S100B. The basic deflection factor is 5 millivolts per division of CRT deflection. To increase the basic deflection

factor to the values indicated on the front panel, precision attenuators are switched into the circuit. S100B is a cam-type switch and the dots on the contact-closure chart (see Diagram 1) indicate when the associated contacts are in the position shown (open or closed). In the 5 mV/Div and 10 mV/Div positions, the attenuators are not used; the input signal is connected directly to the Input Source Follower. The 10 mV/Div position decreases the gain of the 2X Gain Amplifier. For switch positions above 10 mV/Div, the attenuators are switched into the circuit singly or stacked to produce the deflection factor indicated on the front panel. These hybrid attenuators are frequency-compensated voltage dividers. For DC and low-frequency signals, the attenuators act as resistance dividers; at high frequencies the attenuator acts as a capacitive divider.

In addition to providing constant attenuation at all frequencies within the bandwidth of the instrument, the input attenuators are designed to maintain the same input RC characteristics (one megohm X 20 pF). Each attenuator contains an adjustable series capacitor to provide correct attenuation at high frequencies, and an adjustable shunt capacitor to provide correct input capacitance.

Input Source Follower

Q150A and Q140 form a cascode amplifier with Q150B providing a constant current. R132 limits the current drive to the gate of Q150A. Dual-diode CR130 provides circuit protection by limiting the voltage swing at the gate of Q150A to about ±9 volts. R134, C130, and the capacitance of R130 provide low frequency compensation. Input capacitance for the 5 mV and 10 mV positions is set by C134. The output of the 2X Gain Amplifier (U1350) is from the source of Q150A and high frequencies from the collector of Q140. R160 is used to balance the input to the 2X Gain Amplifier between the 5 mV and 10 mV positions.

2X Gain Amplifier

T1301 is a balun transformer which provides differential drive to U1350 at high frequencies. U1350 is a paraphase type amplifier with dual differential output capabilities.

In the 5 mV position, full drive is provided from pins 5 and 9 of U1350 to the U1450 load resistors R1401 and R1403. In all other attenuator positions the signal path drive current through the load resistors is divided in half. The other half is diverted through pins 6 and 8 of U1350 and is dissipated in dummy load resistors R1343 and R1341.

CR1391 and R1319 maintain proper collector voltage while switching between the 5 mV and 10 mV positions. C1331, R1331, C1332 and R1332 are thermal compensations. C1334 and RT1334 provide high-frequency temperature compensation. R1336, C1336, C1345, L1345 and R1345 are high-frequency adjustments.

Fixed length inductors and capacitors are part of the Amplifier etched circuit board and provide T-coil peaking at the input of U1350.

Gain Amplifier

U1450 is a variable-gain cascode amplifier which sets the overall channel gain. The GAIN (R1423A) and VARIABLE (R1423B) controls determine the ratio of base currents through pins 11 and 12 of U1450. The base-current ratio determines the shared collector output levels betweens pins 5, 6 and 8, 9.

R1436 provides adjustable low frequency compensation. Fixed components R1434, C1434, C1436, R1431, and C1431 compensate for temperature variations. R1435 and C1435 are adjustable high frequency compensations. U1450 Input T-coil peaking inductors and capacitors are part of the etched circuit board. DC balance over the variable range is adjusted by R1353.

Position Circuit

Positioning current is added to the signal current of U1450 output from the current sources Q1470 and Q1490. R1465 controls the voltage at the bases of the current sources, which in turn determines the amount of positioning current added. R1467, R1465, and CR1465 provide trace shift current for the IDENTIFY function.

Display Channel Switch Amplifier

The third cascode amplifier, U1550 is used for controlling the channel 1 display modes. When the DISPLAY CH 1 ON Level at pin 11 is HI, the channel 1 signal passes through the transistor pair with outputs at pins 6 and 8 to the level shifters. At the same time the DISPLAY CH 1 OFF Level at pin 12 is LO, turning off the second transistor pair collectors, pins 5 and 9. When pin 12 is HI, channel 1 is displayed and when pin 11 is HI channel 1 is not displayed. Pins 11 and 12 are always in opposite states, the levels being selected by the DISPLAY MODE switch S30A. The signal is routed through T-coiled bases of U1550 to the trigger amplifier switch, U1750, which is also T-coiled. C1531 and R1531 are high frequency adjustments.

Trigger Channel Switch Amplifier

U1750 is a cascode amplifier used as the trigger switch, and operates similarly to the Display Channel Switch Amplifier, U1550. The TRIGGER SOURCE switch, S30B determines the base levels on pins 11 and 12 of U1750 for trigger selection.

Display and Trigger Common Base Level Shifters

The Display Out Common Base Level Shifters, Q820, Q840, Q860, and Q880 are used to return the DC signal level to zero volts at the plug-in interface for display output. Bandwidth selection is obtained by controlling base currents with the BW switch, S32, Q820 and Q840 are shifters at FULL BANDWIDTH and Q860, Q880 are used at 20 megahertz. The level shifters also serve as a current summing point for CH 1 and CH 2 selection.

The pi filter is used in the collectors of Q860 and Q880. The pi filter is isolated from the output by CR860 and CR880 when the BW switch is in FULL.

The Trigger Output Common Base Level Shifters Q920, Q940, Q960, and Q980 operation is similar to the Display Output Shifters just discussed.

Channel 2 Gain-Polarity Amplifier

CH 2 operation is the same as CH 1. For circuit number reference the prefix number for CH 1 is 1 and CH 2 is 2. For instance, U2350 functions in CH 2 the same as does U1350 in CH 1. In CH 2 a Polarity feature is included in the second cascode amplifier U2450. S22A allows base drives to be reversed to U2450. Polarity Gain R2411, matches the gain in both polarity positions.

Translator

A schematic of the Translator circuit is shown on Diagram 4 in the Diagrams section. The translator, Q1050 and Q1070, increase the CHOP and ALT control logic DC levels from the mainframe to a usable level in the 7A26. CR1060 and CR1062 keep Q1050 and Q1070 from going into saturation.

Readout Encoding

The Readout Encoding circuit consists of switching resistors and probe sensing stage Q620. This circuit encodes the Channel 1 and 2, Row and Column output lines for readout of deflection factor, uncalibrated deflection factor (VARIABLE) information, and signal inversion (Channel 2 only). Data is encoded on these output lines by switching resistors between them and the time-slot input lines, or by adding current through Q620.

R647-CR647 are switched between time-slot three (TS-3) and Column output line when the CAL IN switch is in the uncal position. This results in the symbol > (greater than) being displayed preceding the deflection factor readout. R648 (Channel 2 only) is switched between TS-2 and the Column output line when the CH 2 POLARITY switch is in the INVERT position. This results in the symbol ↓ (inverted) being displayed preceding the deflection factor readout.

Switching resistors are used to indicate the setting of the VOLTS/DIV switch to the mainframe readout system. The VOLTS/DIV switch is a cam-type switch. The dots on the contact-closure chart (see Diagram 4) indicate when the associated contacts are closed. R633, R634, and R635 select the number 1, 2, or 5 depending on the resistor combination that is switched in. R637 selects the m (milli-) prefix and R639 selects the symbol V (volts) in the 5 mV through .5 V (500 mV) positions of the VOLTS/DIV switch. R638 selects the symbol V in the 1, 2, and 5 V positions. R630, R631, and the output of the probe sensing stage (Q620) select the decimal point (number of zeroes) again depending on the resistor combination switched in by the VOLTS/DIV switch.

Probe sensing stage Q620 identifies the attenuation factor of the probe connected to the input connector by sensing the amount of current flowing from the current sink through the probe coding resistance. The output of this circuit corrects the mainframe readout system to include the probe attenuation factor. The third contact of the input connector provides the input to the probe sensing stage from the probe coding resistance (coded probes only; see Operating Instructions). The third contact is also used for the IDENTIFY input. The coding resistor forms a voltage divider with R621 through CR621 to the −15 V supply. The resultant voltage sets the bias on Q620 and determines, along with emitter resistor R622, the collector current. When the −15 volt time-slot pulse is applied to Interface Connector B33, Q620 is interrogated and its collector current is added to the column current output through Interface Connector A37.

With a 1X probe (or no probe) connected to the input connector, Q620 is turned off. The deflection factor readout is determined by the VOLTS/DIV switch position. With a 10X probe connected, the bias on Q620 will allow 100 microamperes of collector current to flow. This increases the deflection factor readout by a factor of 10.

The IDENTIFY button (S1465 on Diagram 2 or S2465 on Diagram 3) does two things when pressed:

1. It causes the trace representing the appropriate channel of the 7A26 to move about 0.3 division (see the front panel controls and connectors, Fig. 1-3).

2. It forward biases CR621 and Q620 to result in a sufficient amount of collector current which, when added to the column current output, replaces the deflection factor readout with the word "IDENTIFY".

These two actions aid in identifying the 7A26 trace when multiple traces are displayed. When the IDENTIFY button is released, the deflection factor readout and trace position are restored.

CR1465 in CH 1, and CR2465 in CH 2 isolate readout circuitry from the position circuitry. For further information on the operation of the readout system, see the oscilloscope instruction manual.

MAINTENANCE

Introduction

This section of the manual contains maintenance information for use in preventive maintenance, corrective maintenance, and troubleshooting of the 7A26.

Further maintenance information relating to general maintenance can be found in the instruction manuals for the 7000-series oscilloscopes.

PREVENTIVE MAINTENANCE

General

Preventive maintenance, consisting of cleaning, visual inspection, etc., performed on a regular basis, will improve the reliability of this instrument. Periodic checks of the semiconductor devices used in the unit are not recommended as a preventive maintenance measure.

Cleaning

CAUTION

Avoid the use of chemical cleaning agents which might damage the plastics used in this instrument. Special care should be taken when cleaning the Polyphenylene Oxide attenuator boards. Do not apply any solvent containing ketones, esters or halogenated hydrocarbons. To clean, use only water soluble detergents, ethyl, methyl or isopropyl alcohol.

Front Panel. Loose dust may be removed with a soft cloth or a dry brush. Water and mild detergent may be used; however, abrasive cleaners should not be used.

Interior. Cleaning the interior of the unit should precede calibration, since the cleaning process could alter the settings of the calibration adjustments. Use low-velocity compressed air to blow off the accumulated dust. Hardened dirt can be removed with a soft dry brush, cotton-tipped swab, or cloth dampened with a mild detergent and water solution.

Lubrication

Use a cleaning-type lubricant on shaft bushings, interconnecting plug contacts, and switch contacts. Lubricate switch detents with a heavier grease. A lubrication kit containing the necessary lubricating materials and instructions is available through any TEKTRONIX Field Office. Order TEKTRONIX Part Number 003-0342-01.

TROUBLESHOOTING

General

The following is provided to augment information contained in other sections of this manual when troubleshooting the 7A26. The schematic diagrams, circuit description, and calibration sections should be used to full advantage. The theory of operation section gives detailed information on circuit behavior and output requirements.

Troubleshooting Aids

Diagrams. Circuit diagrams are given on foldout pages in Section 7. The circuit number and electrical value of each component in this instrument are shown on the diagrams.

Circuit Boards. The circuit boards used in the 7A26 are outlined on the schematic diagrams, and photographs of the boards are shown on the backs of the schematic diagrams. Each board-mounted electrical component is identified on the photograph by its circuit number.

Component and Wiring Color Code. Colored stripes or dots on resistors and capacitors signify electrical values, tolerances, etc., according to the EIA standard color code. Components not color coded usually have the value printed on the body.

The insulated wires used for interconnection in the 7A26 are color coded to facilitate tracing wires from one point to another in the unit.

Semiconductor Lead Configuration. The lead configurations of the semiconductor devices used in this instrument are shown on the foldout following the schematic diagrams.

Troubleshooting Equipment

The following equipment is useful for troubleshooting the 7A26.

1. Semiconductor Tester—Some means of testing the transistors, diodes, and FET's used in this instrument is helpful. A transistor-curve tracer such as the TEKTRONIX Type 576 will give the most complete information.

2. DC Voltmeter and Ohmmeter—A voltmeter is required for checking voltages within the circuits, and an ohmmeter for checking resistors and diodes.

3. Test Oscilloscope—A test oscilloscope is required to view waveforms at different points in the circuit. A TEKTRONIX 7000-series mainframe equippped with a readout system. 7D13 Digital Multimeter unit, 7B-series Time-Base unit, and a 7A-series amplifier unit with a 10X probe will meet the needs of both items 2 and 3.

4. Plug-in Extender—A fixture that permits operation of the unit outside of the plug-in compartment for better accessibility during troubleshooting. Order TEKTRONIX Part Number 067-0589-00.

Troubleshooting Procedure

This troubleshooting procedure is arranged in an order which checks the simple trouble possibilities before proceeding with extensive troubleshooting.

1. Check Control Settings. An incorrect setting of the 7A26 controls can indicate a trouble that does not exist. If there is any question about the correct function or operation of a control or front-panel connector, see the Operating Instructions section.

2. Check Associated Equipment. Before proceeding with troubleshooting of the 7A26 check that the equipment used with this instrument is operating correctly. If possible, substitute an amplifier unit known to be operating correctly into the indicator unit and see if the problem persists. Check that the input signals are properly connected and that the interconnecting cables are not defective.

3. Visual Check. Visually check the portion of the instrument in which the trouble is suspected. Many troubles can be located by visual indications, such as unsoldered connections, broken wires, damaged circuit boards, damaged components, etc.

4. Check Instrument Performance. Check the calibration of the unit or the affected circuit, by performing Performance Check of Section 5. The apparent trouble may only be a result of mis-adjustment, and may be corrected by calibration. Complete calibration instructions are given in Section 5.

5. Check Voltages. Often the defective component or stage can be located by checking the voltage in the circuit.

6. Check Individual Components. The following methods are provided for checking the individual components. Components which are soldered in place are best checked by disconnecting one end to isolate the measurement from the effects of surrounding circuitry.

NOTE

To locate intermittent or temperature sensitive components mounted on the attenuator board, Quik Freeze (Miller Stephenson, MS-240, TEKTRONIX Part Number 006-0173-01) is recommended. Dry ice or dichlordi-fluorremethane (Freon 12, Dupont or Can-O-Gas) may also be used. Other types of circuit coolant may damage the polyphenylene oxide boards.

A. TRANSISTORS. The best check of transistor operation is actual performance under operating conditions. If a transistor is suspected of being defective, it can best be checked by substituting a component known to be good; however, be sure that circuit conditions are not such that a replacement might also be damaged. If substitute transistors are not available, use a dynamic tester (such as TEKTRONIX Type 576). Static-type testers may be used, but since they do not check operation under simulated operating conditions, some defects may go unnoticed. Be sure the power is off before attempting to remove or replace any transistor.

B. DIODES. A diode can be checked for an open or shorted condition by measuring the resistance between terminals. With an ohmmeter scale having an internal source of between 800 millivolts and 3 volts, the resistance should be very high in one direction and very low when the leads are reversed.

CAUTION

Do not use an ohmmeter scale that has a high internal current. High currents may damage the diodes.

C. RESISTORS. Check resistors with an ohmmeter. Resistor tolerance is given in the Electrical Parts List. Resistors normally do not need to be replaced unless the measured value varies widely from the specified value.

D. CAPACITORS. A leaky or shorted capacitor can be detected by checking resistance with an ohmmeter on the highest scale. Use an ohmmeter which will not exceed the voltage rating of the capacitor. The resistance reading should be high after initial charge of the capacitor. An open capacitor can best be detected with a capacitance meter, or by checking whether the capacitor passes AC signals.

7. Repair and Readjust the Circuit. Special techniques required to replace components in this unit are given under Component Replacement. Be sure to check the performance of any circuit that has been repaired or that has had any electrical components replaced. Recalibration of the affected circuit may be necessary.

CORRECTIVE MAINTENANCE

General

Corrective maintenance consists of component replacement and instrument repair. Special techniques required to replace components in this instrument are given here.

Obtaining Replacement Parts

Standard Parts. All electrical and mechanical part replacements for the 7A26 can be obtained through your local TEKTRONIX Field Office or representative. However, many of the electronic components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing or ordering replacement parts, check the parts list for value, tolerance, rating and description.

NOTE

When selecting replacement parts, it is important to remember that the physical size and shape of a component may affect the performance of the instrument, particularly at high frequencies. All replacement parts should be direct replacements unless it is known that a different component will not adversely affect instrument performance.

Special Parts. In addition to the standard electronic components, some special parts are used in the 7A26. These parts are manufactured or selected by Tektronix, Inc. in accordance with our specifications. Most of the mechanical parts used in this instrument have been manufactured by Tektronix, Inc. Order all special parts directly from your local TEKTRONIX Field Office or representative.

Ordering Parts. When ordering replacement parts from Tektronix, Inc., include the following information:

1. Instrument Type.

2. Instrument Serial Number.

3. A description of the part (if electrical, include circuit number).

4. TEKTRONIX Part Number.

Soldering Techniques

WARNING

Disconnect the instrument from the power source before soldering.

Attenuator Circuit Board. The Attenuator Circuit Boards are made from polyphenylene oxide because of its excellent electrical characteristics. Use more than normal care when cleaning or soldering this material. The following rules should be observed when removing or replacing parts:

1. Use a low-wattage soldering iron (not over 15 watts).

2. Do not apply more heat, or apply heat for a longer time, than is absolutely necessary.

3. Use some form of vacuum solder remover when removing multi-lead devices.

4. Do not apply any solvent containing ketones, esters or halogenated hydrocarbons.

5. To clean, use only water-soluble detergents, ethyl, methyl or isopropyl alcohol.

Circuit Boards (except Attenuator board). The components mounted on the circuit boards in the amplifier can be replaced using normal circuit board soldering techniques. Keep the following points in mind when soldering on the circuit boards:

1. Use a pencil-type soldering iron with a (wattage) rating from 15 to 50 watts.

2. Apply heat from the soldering iron to the junction between the component and the circuit board.

3. Heat-shunt the lead to the component by means of a pair of long-nose pliers.

4. Avoid excessive heating of the junction with the circuit board, as this could separate the circuit board wiring from the base material.

5. Use electronic grade 60-40 tin lead solder.

6. Clip off any excess lead length extending beyond the circuit board. Clean off any residual flux with a flux-removing solvent.

Metal Terminals. When soldering metal terminals (potentiometers, etc.) use 60-40 tin-lead solder and a 15 to 50 watt soldering iron. Observe the following precautions when soldering metal terminals:

1. Apply only enough heat to make the solder flow freely.

2. Apply only enough solder to form a solid connection. Excess solder may impair the function of the part.

3. If a wire extends beyond the solder joint, clip off the excess.

4. Clean the flux from the solder joint with a flux-removing solvent.

Component Replacement

WARNING

Disconnect the equipment from the power source before replacing components.

Semiconductor Replacement. Transistors should not be replaced unless actually defective. If removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement of transistors may effect the calibration of this instrument. When transistors are replaced, check the performance of the part of the instrument which may be affected.

Replacement semiconductors should be of the original type or a direct replacement. The pullout following the schematic diagram section shows the lead configurations of the semiconductors used in this instrument. If the replacement semiconductor is not of the original type, check the manufacturer's basing diagram for proper basing.

Circuit Board Removal

In general, the circuit boards used in the 7A26 need never be removed unless they must be replaced. Electrical connections to the boards are made by soldered connections. If it is necessary to replace a circuit board assembly, use the following procedures.

A. READOUT CIRCUIT BOARD REMOVAL

1. Disconnect the wires connected to the outside of the board.

2. Remove the screws holding the board to the mounting surface.

3. Disconnect the wires connected to the inside of the board.

4. Remove the board from the unit.

5. To replace the board, reverse the order of removal.

B. ATTENUATOR CIRCUIT BOARD REMOVAL

1. Remove the readout board for either channel as outlined in the previous procedure.

2. Disconnect the inductor, capacitor, power connector, and ground strap connected to the rear of the board.

3. Loosen the front set screw on the VARIABLE control shaft coupling (use a 0.050-inch hex-key wrench).

4. Remove the red VARIABLE control knob and glass rod from the control shaft.

5. Remove the remaining front-panel knobs using a 1/16-inch hex-key wrench.

6. Remove the front panel from the instrument by prying at center bottom with screwdriver.

7. Remove the attenuator shields.

8. Disconnect the wires and resistor from the INPUT BNC connector.

9. Remove the INPUT BNC connector.

10. Remove the attenuator board with cam switch from the instrument.

11. Replace by reversing the Removal Procedure.

C. AMPLIFIER CIRCUIT BOARD REMOVAL

1. Remove the plastic plug-in guide from the rear of the instrument.

2. Disconnect the wires connected to the amplifier board from the CH 1 readout board and all front panel controls, with the exception of the TRIGGER SOURCE/DISPLAY MODE switch.

3. Loosen the hex-socket screw in the coupling of both the VARIABLE control shafts using a 0.050-inch hex-key wrench. Pull both the VARIABLE knobs and shafts from the front of the instrument.

4. Loosen the hex-socket screws in both the TRIGGER SOURCE and DISPLAY MODE knobs. Remove knobs.

5. Disconnect the inductors, capacitors, power connectors, and ground straps from the front of the board.

6. Remove the screws and nuts securing the board to the chassis or other mounting surface.

7. Remove the board from the instrument.

8. To replace, reverse the order of removal.

Switch Replacement

Several types of switches are used in the 7A26. The slide and micro switches should be replaced as a unit if damaged. The following special maintenance information is provided for the cam-type switches.

CAUTION

Repair of cam-type switches should be undertaken only by experienced maintenance personnel. Switch alignment and spring tension of the contacts must be carefully maintained for proper operation of the switch. For assistance in maintenance of cam-type switches, contact your local TEKTRONIX Field Office or representative.

A. CAM-TYPE SWITCHES

A cam-type switch consists of a rotating cam, which is turned by the front-panel knobs, and a set of contacts mounted on an adjacent circuit board. These switch contacts are actuated by lobes on the cam. The VOLTS/DIV and AC-GND-DC (coupling) cam-type switches can be disassembled for inspection, cleaning, repair, or replacement as follows:

1. Remove the Readout board and the Attenuator board/switch assembly as described previously. The front switch section on the Attenuator board is the AC-GND-DC switch and the rear switch section is the VOLTS/DIV switch. The switches are now open for inspection or cleaning.

2. To completely remove the switch from the board, remove the two screws and four hexagonal posts which hold the cam-type switch to the circuit board.

3. To remove the cam from the front support block, remove the retaining ring from the shaft on the front of the switch and slide the cam out of the support block. Be careful not to lose the small detent roller.

4. To replace defective switch contacts, follow the instructions given in the switch repair kit.

5. To re-install the switch assembly, reverse the above procedure.

Recalibration After Repair

After any electrical component has been replaced, the calibration of that particular circuit should be checked, as well as the calibration of other closely related circuits. Refer to Section 5 for these procedures.

CALIBRATION

Introduction

To assure instrument accuracy, check the calibration of the 7A26 every 1000 hours of operation, or every six months if used infrequently. Before complete calibration, thoroughly clean and inspect this instrument as outlined in the Maintenance section.

TEKTRONIX Field Service

Tektronix, Inc., provides complete instrument repair and recalibration service at local Field Service Centers and the Factory Service Center. Contact your local field office or representative for further information.

Performance Check

The performance of this instrument can be checked by performing only the √ CHECK steps. Performing the steps marked with a √ indicate that the instrument is checked against the tolerances listed as a Performance Requirement (see Specification section).

Limits and tolerances given in other check steps are calibration guides and should not be interpreted as instrument specifications. Operator front-panel adjustments are adjusted as part of the Performance Check procedure.

Calibration

To verify proper calibration of the 7A26 and to prevent unnecessary re-calibration of the entire instrument, perform the Adjust– portion of a step only if the tolerance given in the Check– part of the step is not met.

For best overall instrument performance when performing a complete calibration procedure, make each adjustment to the exact setting even if the Check– is within allowable tolerance.

TEST EQUIPMENT REQUIRED

General

The following test equipment and accessories, or its equivalent, is required for complete calibration of the 7A26. Specifications given for the test equipment are the minimum necessary for accurate calibration. Therefore, the specifications of any test equipment used must meet or exceed the listed specifications. All test equipment is assumed to be correctly calibrated and operating within the listed specifications. Detailed operating instructions for the test equipment are not given in this procedure. Refer to the instruction manual for the test equipment if more information is needed.

Special Calibration Fixtures

Special TEKTRONIX calibration fixtures are used in this procedure only where they facilitate instrument calibration. These special calibration fixtures are available from Tektronix, Inc. Order by part number through your local TEKTRONIX Field Office or representative.

Calibration Equipment Alternatives

All of the listed test equipment is required to completely check and adjust this instrument. The Calibration procedure is based on the first item of equipment given as an example of applicable equipment. When other equipment is substituted, control settings or the calibration setup may need to be altered slightly to meet the requirements of the substitute equipment. If the exact item of test equipment given as an example in the Test Equipment list is not available, first check the Specifications column carefully to see if any other equipment is available which might suffice. Then check the Usage column to see what this item of test equipment is used for. If used for a check or adjustment which is of little or no importance to your measurement requirements, the item and corresponding step(s) can be deleted.

Signal Connections

Detailed signal-connection information is not given in this procedure except when critical for the particular test. Use a BNC T connector to simultaneously connect a signal to two inputs. Refer to the test equipment instruction manuals for other signal-connection information.

TEST EQUIPMENT

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
1. Calibration oscilloscope.	7000-Series oscilloscope mainframe. 7900-Series required to check 7A26 maximum bandwidth.	Used throughout procedure to provide display.	TEKTRONIX 7904 Oscilloscope. Any TEKTRONIX 7000-Series oscilloscopes. Check Specifications for bandwidth.
2. Time Base Unit.	7B-Series time-base unit. Sweep speed to 2 ns/division.	Used throughout procedure to provide horizontal sweep.	TEKTRONIX 7B70 Time Base or equivalent.
3. Standard amplitude calibrator.	Amplitude accuracy, within 0.25%; signal amplitude, 20 mV to 20 V; frequency, 1 kHz square-wave.	Gain calibration.	TEKTRONIX Calibration Fixture 067-0502-01.
4. Square-wave generator.	Output capabilities: 12 V into 50 Ω with a risetime of at least 12 ns and a frequency of approximately 1 kHz; 500 mV into 50 Ω with a risetime of at least 1 ns to 100 kHz.	Input compensation and low frequency compensation.	TEKTRONIX Type 106 Square-Wave Generator.
5. Pulse Generator.	Risetime of at least 70 ps, step amplitude of 200 mV into 50 Ω.	High frequency compensation.	TEKTRONIX Type 284 Pulse Generator.
6. High-frequency constant-amplitude signal generator.	Upper frequency range, 225 MHz; reference frequency, approximately 3 MHz; constant amplitude accuracy, within 2% of reference frequency; amplitude range, 0.5 V to 4 V peak-to-peak.	Bandwidth check.	TEKTRONIX Calibration Fixture 067-0532-01.
7. Medium-frequency constant-amplitude sine-wave generator.	Frequency, variable from 50 to 75 megahertz; reference frequency, 50 kilohertz; output amplitude variable from 5 millivolts to 50 millivolts into 50 ohms; output amplitude constant within 3% at 50 kilohertz and 50 to 75 megahertz.	Common mode rejection.	TEKTRONIX Type 191 Constant-Amplitude Signal Generator.
Accessories			
1. BNC cable	Connectors, BNC; length, 42 inches.	Used throughout procedure.	TEKTRONIX Part Number 012-0057-01.
2. GR cable	Connectors, GR; impedance, 50 Ω; length, approximately 20 inches.	High frequency compensation.	TEKTRONIX Part Number 017-0515-00.
3. 5X attenuator	Connectors, GR; impedance, 50 Ω.	High frequency compensation.	TEKTRONIX Part Number 017-0079-00.
4. 10X attenuator	Connectors, GR; impedance, 50 Ω.	Used throughout procedure.	TEKTRONIX Part Number 017-0078-00.
5. RC normalizer	Time constant, 1 MΩ X 20 pF; connectors, BNC; attenuation, 2X.	Input compensation.	TEKTRONIX Part Number 067-0538-00.
6. Termination (through line)	Impedance, 50 Ω; connectors, GR to BNC male.	Used throughout procedure.	TEKTRONIX Part Number 017-0083-00.
7. Dual-input cable	Connectors, BNC; matched signal transfer to each input.	Common mode rejection.	TEKTRONIX Calibration Fixture 067-0525-00.
Adjustment tools			
1. Screwdriver	Three-inch shaft, 3/32-inch bit.	Used for potentiometer adjustments.	Xcelite R-3323.
2. Low-capacitance screwdriver	1 1/2-inch shaft.	Used for variable capacitor adjustments.	TEKTRONIX Part Number 003-0000-00.
3. Tuning tool	Handle with inserts.	Used for capacitance and attenuator adjustments.	TEKTRONIX Part Numbers 003-0307-00, 003-0334-00, and 003-0497-00.

CALIBRATION PROCEDURE

General

The following procedure is arranged so the 7A26 can be calibrated with the least interaction of adjustments and reconnection of equipment. The control settings and test equipment setups throughout this procedure continue from the preceding steps unless otherwise noted.

NOTE

Control titles which are printed on the front panel of the 7A26 are capitalized (e.g., POSITION). Internal adjustments and associated equipment controls are initially capitalized only (e.g., oscilloscope Vertical Mode).

Preliminary Procedure for Calibration

1. Remove the oscilloscope left side cover and side panel of plug-in.

2. Insert the 7A26 in the calibration oscilloscope Left Vertical compartment.

3. Insert the time-base unit into the calibration oscilloscope Horizontal compartment.

4. Turn oscilloscope on and allow 20 minutes warm-up before proceeding.

NOTE

This instrument should be calibrated at an ambient temperature of +20°C to +30°C for best overall accuracy. The performance of the instrument can be checked at any temperature within the 0°C to +50°C range.

Preliminary Control Settings

Set the calibration oscilloscope and time-base unit for a sharp, well-defined trace. Set the 7A26 controls as follows:

7A26

DISPLAY MODE	CH 1
TRIGGER SOURCE	MODE
CH 2 POLARITY	+UP
BW	FULL

CH 1 and CH 2

POSITION	Midrange
VOLTS/DIV	10 mV
AC-GND-DC	DC

INDEX TO CALIBRATION PROCEDURE

1. Check/Adjust Channel 1 and 2 2X BAL and DC Balance (R160, R1353), (R160, R2353). Check CH 2 POLARITY switch, and BW switch balance. — Page 5-4

√ 2. Check/Adjust Channel 1 and 2 GAIN (R1317, R2317). — Page 5-4

Check/Adjust Polarity Gain (R2410).

√ 3. Check Channel 1 and 2 Deflection Factor Accuracy. — Page 5-5

4. Check Channel 1 and 2 VARIABLE (VOLTS/DIV) Range. — Page 5-6

5. Check Channel 1 and 2 Trace IDENTIFY. — Page 5-6

6. Check/Adjust Channel 1 and 2 Attenuator Compensation, (C134, C106, C107, C110, C111, C114, C115, C118, C119). — Page 5-6

7. Check/Adjust Channel 1 and 2 Low-Frequency Compensation (R1436, R2436). — Page 5-6

8. Check/Adjust Channel 1 and 2 High-Frequency Compensation (C2336, R2336, C2435, R2435, C2531, R2531, C2345, R2345), (C1336, R1336, C1435, R1435, C1531, R1531, C1345, R1345). — Page 5-7

√ 9. Check Common-Mode Rejection Ratio. — Page 5-7

√10. Check Alternate Operation. — Page 5-7

√11. Check Chopped Operation. Page 5-7

√12. Check TRIGGER SOURCE Operation. Page 5-8

√13. Check Channel 1 and 2 Bandwidth. Page 5-8

Location of Adjustments

The locations of the 7A26 adjustments are shown in Fig. 7-7 on the fold-out page following the schematic diagrams.

1. Check/Adjust Channel 1 and 2 DC Balance

a. Position the trace to the center horizontal line with the CH 1 POSITION control.

b. ADJUST—Channel 1 2X BAL adjustment R160 for minimum vertical trace shift as the CH 1 VOLTS/DIV control is moved between the 5 mV and 10 mV positions. The trace should not move more than 0.5 division vertically.

c. Set the CH 1 VOLTS/DIV control to 5 mV.

d. Push and release the CH 1 VARIABLE (VOLTS/DIV) control to its outward position.

e. CHECK—Turn the VARIABLE control from fully counterclockwise to fully clockwise. Trace should not move more than 0.5 division vertically.

f. ADJUST—Channel 1 DC Balance, R1353, for minimum trace shift as the CH 1 VARIABLE control is rotated from fully counterclockwise to fully clockwise.

g. Set the CH 1 VARIABLE control to the CAL IN position.

h. Set the DISPLAY MODE switch to CH 2.

i. Position the trace to the center horizontal line with the CH 2 POSITION control.

j. ADJUST—Channel 2 2X BAL adjustment R160 for minimum vertical trace shift as the CH 2 VOLTS/DIV control is moved between the 5 mV and 10 mV positions. The trace should not move more than 0.5 division vertically.

k. Set the CH 2 VOLTS/DIV control to 5 mV.

l. CHECK—While switching from +UP to INVERT, trace should not move more than 0.5 division vertically.

m. ADJUST—Channel 2 DC Balance, R2353, for minimum trace shift while switching CH 2 POLARITY from +UP to INVERT.

n. Set the CH 2 POLARITY switch to +UP.

o. CHECK—Shift the BW switch between FULL and 20 MHz. The trace should not move more than 0.5 division vertically.

p. Set the BW switch to FULL.

q. Set the CH 2 POLARITY switch to +UP.

√2. Check/Adjust Channel 1 and 2 GAIN

a. Connect the standard amplitude calibrator to the CH 2 input connector with a BNC cable.

b. Set the standard amplitude calibrator for 20 millivolt square-wave output.

c. Position the display to the center of the graticule with the CH 2 POSITION control.

d. CHECK—CRT display for exactly four divisions in amplitude.

e. ADJUST—CH 2 GAIN adjustment (front panel) for exactly four divisions of deflection. To adjust, press in the GAIN knob with a screwdriver and turn until the GAIN control is engaged.

f. Set the CH 2 AC-GND-DC switch to AC.

g. CHECK—Shift the CH 2 POLARITY switch between +UP and INVERT. The trace amplitude should not change more than 0.05 division.

h. ADJUST—Polarity Gain R2411 for minimum gain change while shifting the CH 2 POLARITY switch between +UP and INVERT. Recheck CH 2 GAIN because of interaction between step e and h.

i. Set the CH 2 AC-GND-DC switch to DC.

j. Set the CH 2 VOLTS/DIV switch to 10 mV.

k. Set the standard amplitude calibrator for 50-millivolt square-wave output.

l. CHECK—CRT display for exactly five divisions in amplitude.

m. ADJUST—Channel 2 2X GAIN R2317 for exactly five divisions in amplitude.

n. Disconnect the standard amplitude calibrator from the CH 2 input connector and connect it to the CH 1 input connector.

o. Set the DISPLAY MODE switch to CH 1.

p. Set the standard amplitude calibrator for 20-millivolt square-wave output.

q. Position the display to the center of the graticule with the CH 1 POSITION control.

r. CHECK—CRT display for exactly four divisions in amplitude.

s. ADJUST—CH 1 GAIN adjustment (front panel) for exactly four divisions of deflection. To adjust, press in the GAIN knob with a screwdriver and turn until the GAIN control is engaged.

t. Set the CH 1 VOLTS/DIV switch to 10 mV.

u. Set the standard amplitude calibrator for 50-millivolt square-wave output.

v. CHECK—CRT display for exactly five divisions in amplitude.

w. ADJUST—Channel 1 2X GAIN R1317 for exactly five divisions in amplitude.

√3. Check Channel 1 and 2 Deflection Factor Accuracy

a. CHECK—Using the CH 1 VOLTS/DIV and standard amplitude calibrator settings given in Table 5-1, check vertical deflection within 2% in each position of the CH 1 VOLTS/DIV switch.

b. Disconnect the standard amplitude calibrator from the CH 1 input connector and connect it to the CH 2 input connector.

c. Set the DISPLAY MODE switch to CH 2.

d. Repeat part a of this step for channel 2.

TABLE 5-1

Vertical Deflection Accuracy

VOLTS/DIV Switch Setting	Standard Amplitude Calibrator Output	Vertical Deflection in Divisions	Maximum Error for ±2% Accuracy (divisions)
5 mV	20 mV	4	±.08
10 mV	50 mV	5	Set in step 2
20 mV	0.1 V	5	±0.1
50 mV	0.2 V	4	±.08
.1 V	0.5 V	5	±0.1
.2 V	1 V	5	±0.1
.5 V	2 V	4	±.08
1 V	5 V	5	±0.1
2 V	10 V	5	±0.1
5 V	20 V	4	±.08

4. Check Channel 1 and 2 VARIABLE (VOLTS/DIV) Range

a. Set the Channel 1 and 2 VOLTS/DIV switches to 10 mV and the standard amplitude calibrator for a 50-millivolt output.

b. Press and release the CH 2 VARIABLE control to its outward position.

c. CHECK–With the CH 2 VARIABLE control fully counterclockwise, check for two divisions or less of deflection. Change POLARITY switch to INVERT and check for two divisions or less. Return to the +UP position.

d. Return the CH 2 VARIABLE control to the CAL IN position.

e. Disconnect the standard amplitude calibrator from the CH 2 input connector and connect it to the CH 1 input connector.

f. Set the DISPLAY MODE switch to CH 1.

g. Repeat parts b, c, and d of this step for channel 1.

h. Disconnect all test equipment.

5. Check Channel 1 and 2 Trace IDENTIFY

a. Center the CRT display vertically with the CH 1 POSITION control.

b. CHECK–Press the IDENTIFY button and check that the trace moves upward.

c. Set the DISPLAY MODE switch to CH 2 and repeat parts a and b of this step for Channel 2.

6. Check/Adjust Channel 1 and 2 Low-Frequency Compensation

a. Connect the Square-wave Generator to the 7A26 CH 1 input through a 10X 50 Ω attenuator and a 50 Ω terminator.

b. Set the Square-wave Generator to obtain approximately six vertical divisions of a 1 kHz square wave.

c. ADJUST–R1436, LF compensation control, for best flat top (minimum tilt).

d. Disconnect the Square-wave Generator from CH 1 and connect to the CH 2 input connector.

e. Set the DISPLAY MODE switch to CH 2.

f. ADJUST–R2436, LF compensation control, for best flat top (minimum tilt).

g. Disconnect all test equipment.

7. Check/Adjust Channel 1 and 2 Attenuator Compensation

a. Connect the Square-wave Generator high-amplitude output to the CH 2 input connector through a 10X 50 Ω attenuator, 50 Ω termination, and a 20 pF RC Normalizer.

b. Set the CH 1 and CH 2 VOLTS/DIV switches to 5 mV.

c. Set the Square-wave Generator to obtain a 1 kHz, six-division display.

d. ADJUST–And check CH 2 attenuator compensations as given in Table 5-2 for optimum square corner and flat top on the displayed waveform (use tuning tool). Maintain a six-division display for all VOLTS/DIV switch positions, removing the 10X attenuator and the 50 Ω termination when necessary.

TABLE 5-2

Attenuator Compensation

VOLTS/DIV Switch Setting	Adjust for Optimum	
	Square Corner	Flat Top
5 mV	C134	–
10 mV	Check	Check
20 mV	C106	C107
50 mV	C110	C111
.1 V	C114	C115
.2 V	Check	Check
.5 V	Check	Check
1 V	C118	C119
2 V	Check	Check
5 V	Check	Check

e. Disconnect the Normalizer from CH 2 and connect to the CH 1 input connector.

f. Set the DISPLAY MODE switch to CH 1.

g. Repeat part b of this step for channel 1.

h. Disconnect the Square-wave Generator from the 7A26 and return the CH 1 and CH 2 VOLTS/DIV switch to 10 mV.

8. Check/Adjust Channel 1 and 2 High-Frequency Compensation

a. Set the CH 1 and CH 2 VOLTS/DIV switches to 10 mV.

b. Connect the Pulse Generator to the 7A26 CH 2 input through a 5X 50 Ω attenuator and a 50 Ω terminator.

c. Set the time-base unit to obtain a triggered display at a rate of approximately 0.2 μs per division.

d. Position the top of the waveform to 1 division above center screen. Note the peak to peak amplitude.

e. CHECK—Aberrations should not exceed +4% or —4% and 6% peak to peak of the pulse amplitude noted in part d.

f. ADJUST—High-frequency compensations C2336, R2336, C2435, R2435, C2531, R2531, C2345, and R2345 for best front corner and flat top.

g. Disconnect the Pulse Generator from CH 2 and connect to the CH 1 input through a 5X 50 Ω attenuator and a 50 Ω terminator.

h. Set the DISPLAY MODE switch to CH 1.

i. CHECK—Aberrations should not exceed +4% or —4% and 6% peak to peak of the pulse amplitude.

j. ADJUST—High-frequency compensations C1336, R1336, C1435, R1435, C1531, R1531, C1345, and R1345 for best front corner and flat top.

k. Disconnect all test equipment.

√ 9. Check Common-Mode Rejection Ratio

a. Set the CH 1 and CH 2 VOLTS/DIV switches to 5 mV.

b. Connect the medium-frequency generator to the CH 1 and CH 2 input connectors through the 50 Ω termination and the dual-input cable.

c. Set the constant-amplitude generator for an eight-division display (40 millivolts) at 50 megahertz.

d. Change the following control settings:

DISPLAY MODE	ADD
CH 2 POLARITY	INVERT

e. CHECK—CRT display for 0.8 division or less deflection (common-mode rejection ratio 10:1 or better).

f. Disconnect all test equipment.

√ 10. Check Alternate Operation

a. Set the DISPLAY MODE switch to ALT.

b. Position the traces about two divisions apart.

c. Turn the time-base unit time/division switch throughout its range.

d. CHECK—Trace alternation between channel 1 and 2 at all sweep rates. At faster sweep rates, alternation will not be apparent; instead display appears as two traces on the screen.

√ 11. Check Chopped Operation

a. Set the DISPLAY MODE switch to CHOP.

b. CHECK—CRT display for two traces.

√ 12. Check Trigger Source Operation

a. Change the following control settings:

DISPLAY MODE	ALT
TRIGGER SOURCE	CH 1

b. Connect the Indicator oscilloscope cal out connector to the CH 1 input connector.

c. Set the time-base unit for a stable display at a sweep rate of 0.5 millisecond/division.

d. Connect the square-wave generator through a 50 Ω termination to the CH 2 input connector. Set CH 2 to .2 V/div.

e. Set the square-wave generator for a one-division (200 millivolts) one-kilohertz signal.

f. CHECK—CRT display; CH 1 trace is stable and CH 2 trace cannot be triggered.

g. Set the TRIGGER SOURCE switch to CH 2.

h. Adjust the time-base triggering for a stable display.

i. CHECK—CRT display; CH 2 trace is stable and CH 1 trace cannot be triggered.

j. Set the TRIGGER SOURCE switch to MODE.

k. CHECK—CRT display; CH 1 trace and CH 2 trace can both be triggered.

l. Disconnect all test equipment.

√ 13. Check Channel 1 and 2 Bandwidth

a. Connect the high-frequency constant amplitude signal generator to the 7A26 CH 1 input through a 50 Ω termination.

b. Set the high-frequency constant amplitude signal generator to the reference frequency of 3 MHz and adjust the output amplitude to obtain a 6 division display.

c. Change the frequency of the high-frequency constant amplitude signal generator to the value given in Table 5-3 relative to the individual mainframe.

d. CHECK—That the amplitude of the display is 4.2 divisions or greater.

TABLE 5-3

System Bandwidth

Mainframe	Bandwidth
7900-Series	*200 megahertz
7700-Series	*150 megahertz
7600-Series	*100 megahertz
7500-Series	* 90 megahertz
7400-Series	* 60 megahertz

*See part c of step 13.

e. Disconnect the high-frequency constant signal generator and 50 Ω termination from CH 1 and connect to CH 2 input.

f. Set the DISPLAY MODE switch to CH 2.

g. Repeat parts b, c, and d of this step for CH 2.

h. Disconnect all test equipment.

This completes the calibration for the 7A26.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00853	Sangamo Electric Co., S. Carolina Div.	P. O. Box 128	Pickens, SC 29671
01121	Allen-Bradley Co.	1201 2nd St. South	Milwaukee, WI 53204
01295	Texas Instruments, Inc., Semiconductor Group	P. O. Box 5012	Dallas, TX 75222
03508	General Electric Co., Semi-Conductor Products Dept.	Electronics Park	Syracuse, NY 13201
07263	Fairchild Semiconductor, A Div. of Fairchild Camera and Instrument Corp.	464 Ellis St.	Mountain View, CA 94042
07910	Teledyne Semiconductor	12515 Chadron Ave.	Hawthorne, CA 90250
17856	Siliconix, Inc.	2201 Laurelwood Rd.	Santa Clara, CA 95054
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
50157	N. L. Industries, Inc., Electronics Dept.	P. O. Box 787	Muskegon, MI 49443
56289	Sprague Electric Co.		North Adams, MA 01247
72982	Erie Technological Products, Inc.	644 W. 12th St.	Erie, PA 16512
73138	Beckman Instruments, Inc., Helipot Div.	2500 Harbor Blvd.	Fullerton, CA 92634
75042	TRW Electronic Components, IRC Fixed Resistors, Philadelphia Division	401 N. Broad St.	Philadelphia, PA 19108
79727	C-W Industries	550 Davisville Rd.	Warminster, PA 18974
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97077
80294	Bourns, Inc., Instrument Div.	6135 Magnolia Ave.	Riverside, CA 92506
80740	Beckman Instruments, Inc.	2500 Harbor Blvd.	Fullerton, CA 92634
90201	Mallory Capacitor Co., Div. of P. R. Mallory Co., Inc.	3029 E. Washington St.	Indianapolis, IN 46206

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2324-01	B010100	B059999	CKT BOARD ASSY:ATTENUATOR CH1	80009	670-2324-01
A1	670-2324-00	B060000	B079999	CKT BOARD ASSY:ATTENUATOR CH1	80009	670-2324-00
A1	670-2324-03	B030000		CKT BOARD ASSY:ATTENUATOR CH1	80009	670-2324-03
A2	670-2310-01	B010100	B059999	CKT BOARD ASSY:READOUT CH1	80009	670-2310-01
A2	670-2310-00	B060000		CKT BOARD ASSY:READOUT CHA	80009	670-2310-00
A3	670-2324-01	B010100	B059999	CKT BOARD ASSY:ATTENUATOR CH2	80009	670-2324-01
A3	670-2324-00	B060000	B079999	CKT BOARD ASSY:ATTENUATOR CH2	80009	670-2324-00
A3	670-2324-03	B080000		CKT BOARD ASSY:ATTENUATOR CH2	80009	670-2324-03
A4	670-2310-01	B010100	B059999	CKT BOARD ASSY:READOUT CH2	80009	670-2310-01
A4	670-2310-00	B060000		CKT BOARD ASSY:READOUT CH2	80009	670-2310-00
A5	670-2549-00	B010100	B049999	CKT BOARD ASSY:AMPLIFIER	80009	670-2549-00
A5	670-2549-01	B050000	B069999	CKT BOARD ASSY:AMPLIFIER	80009	670-2549-01
A5	670-2549-02	B070000		CKT BOARD ASSY:AMPLIFIER	80009	670-2549-02
C10	285-0816-00			CAP.,FXD,PLSTC:0.019UF,10%,600V	80009	285-0816-00
C13	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C15	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C106 C107	307-1010-00			ATTENUATOR,FXD:2X	80009	307-1010-00
C110 C111 C114	307-1012-00			ATTENUATOR,FXD:5X	80009	307-1012-00
C115	307-1013-01			ATTENUATOR,FXD:10X	80009	307-1013-01
C117	281-0626-00	B010100	B079999X	CAP.,FXD,CER DI:3.3PF,1%,500V	72982	301-000C0J0339B
C118 C119	307-1013-01			ATTENUATOR,FXD:10X	80009	307-1013-01
C130	281-0670-00	B010100	B079999	CAP.,FXD,CER DI:1.8PF,+/-0.1PF,500V	72982	374-005C0K0189B
C130	281-0064-00	B080000		CAP.,VAR,PLSTC:0.25-1.5PF,600V	72982	530-002
C132	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C134	281-0064-00			CAP.,VAR,PLSTC:0.25-1.5PF,600V	72982	530-002
C140	281-0615-00	B010100	B079999	CAP.,FXD,CER DI:3.9PF,+/-0.5PF,200V	72982	374-001C0J0399D
C140	290-0536-00	B080000		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C142	283-0156-00	XB080000		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C144[1]	283-0156-00	XB083790		CAP.,FXD,CER DI:0.001UF,(NOM VALUE),SEL		
C150	281-0562-00	B010100	B079999X	CAP.,FXD,CER DI:39PF,10%,500V	72982	301-000U2J0390K
C154	283-0000-00	B010100	B079999X	CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C156	283-0156-00	XB080000		CAP.,FXD,CER DI:1000PF,+100-0%,200V	72982	8111A208E102Z
C158	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C190	281-0600-00	B010100	B079999X	CAP.,FXD,CER DI:35PF,10%,500V	72982	308-000C0G0350K
C621	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C630	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C634	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C635	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C638	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C643	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C647	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C648	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C649	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C820	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C840	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C860	283-0640-00			CAP.,FXD,MICA D:160PF,1%,100V	00853	D151E161F0
C880	281-0603-00			CAP.,FXD,CER DI:39PF,5%,500V	72982	308-000C0G0390J
C920	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C940	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20

[1]Added if necessary.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C960	283-0640-00			CAP.,FXD,MICA D:160PF,1%,100V	00853	D151E161F0
C980	281-0603-00			CAP.,FXD,CER DI:39PF,5%,500V	72982	308-000C0G0390J
C1012	290-0512-00	B010100	B039999	CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C1012	290-0536-00	B040000		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C1014	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C1018	290-0512-00	B010100	B039999	CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C1018	290-0536-00	B040000		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C1022	290-0512-00	B010100	B039999	CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C1022	290-0536-00	B040000		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C1024	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C1028	290-0512-00	B010100	B039999	CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C1028	290-0536-00	B040000		CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C1032	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1034	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1070	281-0589-00	XB070000		CAP.,FXD,CER DI:170PF,5%,500V	72982	301-057Z5D0171J
C1311	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1327	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1329	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1331	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C1332	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075651474M
C1336	281-0158-00			CAP.,VAR,CER Dl:7-45PF,50V	72982	518-000G7-45
C1339	281-0519-00			CAP.,FXD,CER DI:47PF,+/-4.7PF,500V	72982	308-000C0G0470K
C1345	281-0186-00			CAP.,FXD,PLSTC:1.1-3.5PF,100V		
C1431	283-0142-00	B010100	B029999	CAP.,FXD,CER DI:0.0027UF,5%,200V	72982	875-551B272J
C1431	283-0110-00	B030000	B059999	CAP.,FXD,CER DI:0.005UF,+80-20%,150V	56289	19C242B
C1431	283-0100-00	B060000		CAP.,FXD,CER DI:0.0047UF,(NOM VALUE),SEL		
C1433	281-0628-00			CAP.,FXD,CER DI:15PF,5%,600V	72982	301-000C0G0150G
C1434	281-0546-00			CAP.,FXD,CER DI:330PF,10%,500V	72982	301-000X5P0331K
C1435	281-0158-00			CAP.,VAR,CER Dl:7-45PF,50V	72982	518-000G7-45
C1436	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C1480	281-0534-00			CAP.,FXD,CER DI:3.3PF,+/-0.25PF,500V	72982	301-000C0J0339C
C1490	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C1531	281-0161-00			CAP.,VAR,CER DI:5-15PF,350V	72982	518-000A5-15
C1533	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039651105Z
C1721	281-0123-00	XB050000		CAP.,VAR,CER DI:5-25PF,100V	72982	518-000A5-25
C2311	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C2327	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C2329	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C2331	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C2332	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075651474M
C2336	281-0158-00			CAP.,VAR,CER Dl:7-45PF,50V	72982	518-000G7-45
C2339	281-0519-00			CAP.,FXD,CER DI:47PF,+/-4.7PF,500V	72982	308-000C0G0470K
C2345	281-0186-00			CAP.,FXD,PLSTC:0.019UF,10%,600V	80009	285-0816-00
C2423	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C2424	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C2431	283-0142-00	B010100	B029999	CAP.,FXD,CER DI:0.0027UF,5%,200V	72982	875-551B272J
C2431	283-0110-00	B030000	B059999	CAP.,FXD,CER DI:0.005UF,+80-20%,150V	56289	19C242B
C2431	283-0100-00	B060000		CAP.,FXD,CER DI:0.0047UF,(NOM VALUE),SEL	56289	27303
C2433	281-0628-00			CAP.,FXD,CER DI:15PF,5%,600V	72982	301-000C0G0150G
C2434	281-0546-00			CAP.,FXD,CER DI:330PF,10%,500V	72982	301-000X5P0331K
C2435	281-0158-00			CAP.,VAR,CER Dl:7-45PF,50V	72982	518-000G7-45
C2436	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C2480	281-0659-00			CAP.,FXD,CER DI:4.3PF,+/-0.25PF,500V	72982	301-000C0H0439C

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C2531	281-0161-00			CAP.,VAR,CER DI:5-15PF,350V	72982	518-000A5-15
C2533	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039651105Z
C2720	281-0627-00	XB020000		CAP.,FXD,CER DI:1PF,+/-0.25PF,500V	72982	301-000C0G0109C
C2721	281-0123-00	XB050000		CAP.,VAR,CER DI:5-25PF,100V	72982	518-000A5-25
CR130	152-0321-00			SEMICOND DEVICE:SILICON,35V,100MA	07263	FSA1480
CR621	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR631	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR647	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR860	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR880	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR960	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR980	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1050	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1052	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1056	152-0141-02	XB070000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1058	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1060	152-0141-02	B010100	B069999X	SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1062	152-0141-02	B010100	B069999X	SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1319	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1465	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2319	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2465	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2476	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2496	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
J10	131-0679-00			CONNECTOR,RCPT,:BNC W/HARDWARE	24931	28JR168-1
L118	108-0557-00	B010100	B079999X	COIL,RF:35NH	80009	108-0557-00
L806	108-0420-00			COIL,RF:60NH	80009	108-0420-00
L808	108-0420-00			COIL,RF:60NH	80009	108-0420-00
L860	108-0311-00			COIL,RF:0.18UH	80009	108-0311-00
L880	108-0311-00			COIL,RF:0.18UH	80009	108-0311-00
L960	108-0311-00			COIL,RF:0.18UH	80009	108-0311-00
L980	108-0311-00			COIL,RF:0.18UH	80009	108-0311-00
L1345	108-0420-00			COIL,RF:60NH	80009	108-0420-00
L2345	108-0420-00			COIL,RF:60NH	80009	108-0420-00
LR107	108-0744-00	B010100	B079999X	COIL,RF:81NH(WOUND ON A 75 OHM RESISTOR)	80009	108-0744-00
LR111	108-0745-00	B010100	B079999X	COIL,RF:110NH(WOUND ON A 130 OHM RESISTOR)	80009	108-0745-00
LR701	108-0407-00	XB083790		COIL,RF:37NH(WOUND ON A 51 OHM RESISTOR)	80009	108-0407-00
LR703	108-0407-00	XB083790		COIL,RF:37NH(WOUND ON A 51 OHM RESISTOR)	80009	108-0407-00
LR1010	108-0184-00			COIL,RF:3.2UH(WOUND ON A 10 OHM RESISTOR)	80009	108-0184-00
LR1014	108-0184-00			COIL,RF:3.2UH(WOUND ON A 10 OHM RESISTOR)	80009	108-0184-00
LR1020	108-0184-00			COIL,RF:3.2UH(WOUND ON A 10 OHM RESISTOR)	80009	108-0184-00
LR1024	108-0184-00			COIL,RF:3.2UH(WOUND ON A 10 OHM RESISTOR)	80009	108-0184-00
Q140	151-0367-00	B010100	B079999X	TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q150A,B	151-1032-00			TRANSISTOR:SILICON,FET,DUAL	17856	DN399
Q620	151-0254-00			TRANSISTOR:SILICON,NPN	03508	2N5308
Q820 Q840 Q860 Q880	153-0606-00			TRANSISTOR:SILICON,PNP,MATCHED		
Q920	151-0271-00			TRANSISTOR:SILICON,PNP	01295	SKA4504
Q940	151-0271-00			TRANSISTOR:SILICON,PNP	01295	SKA4504
Q960	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00

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Q980	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q1050	151-0341-00	B010100	B069999	TRANSISTOR:SILICON,NPN	07263	2N3565
Q1050	151-0347-00	B070000		TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q1070	151-0341-00	B010100	B069999	TRANSISTOR:SILICON,NPN	07263	2N3565
Q1070	151-0347-00	B070000		TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q1470	151-0341-00			TRANSISTOR:SILICON,NPN	07263	2N3565
Q1490	151-0341-00			TRANSISTOR:SILICON,NPN	07263	2N3565
Q2470	151-0341-00			TRANSISTOR:SILICON,NPN	07263	2N3565
Q2490	151-0341-00			TRANSISTOR:SILICON,NPN	07263	2N3565
R10	315-0560-00			RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R13	316-0101-00			RES.,FXD,COMP:100 OHM,10%,0.25W	01121	CB1011
R102	317-0105-00			RES.,FXD,COMP:1M OHM,5%,0.125W	01121	BB1055
R104	315-0560-00			RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R106	317-0330-00	XB080000		RES.,FXD,COMP:33 OHM,(NOM VALUE),SEL	01121	BB3305
R110	317-0470-00	XB080000		RES.,FXD,COMP:47 OHM,(NOM VALUE),SEL	01121	BB4705
R114	317-0220-00	XB080000		RES.,FXD,COMP:22 OHM,(NOM VALUE),SEL	01121	BB205
R115	315-0430-00	B010100	B079999	RES.,FXD,COMP:43 OHM,5%,0.25W	01121	CB4305
R115	315-0560-00	B080000		RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R118	315-0360-00	B010100	B079999	RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R118	315-0750-00	B080000		RES.,FXD,COMP:75 OHM,5%,0.25W	01121	CB7505
R119	317-0360-00	XB080000		RES.,FXD,COMP:36 OHM,(NOM VALUE),SEL	01121	BB3605
R130	321-0481-00			RES.,FXD,FILM:1M OHM,1%,0.125W	75042	CEAT0-1004F
R132[1] R133[1]	316-0474-00			RES.,FXD,COMP:470K OHM,10%,0.25W	01121	CB4741
R134	315-0751-00	B010100	B079999	RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R134	315-0471-00	B080000		RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R140	315-0621-00	B010100	B079999	RES.,FXD,COMP:620 OHM,5%,0.25W	01121	CB6215
R140	315-0201-00	B080000		RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R142	315-0132-00	B010100	B079999	RES.,FXD,COMP:1.3K OHM,5%,0.25W	01121	CB1325
R142	315-0621-00	B080000		RES.,FXD,COMP:620 OHM,5%,0.25W	01121	CB6215
R144	315-0221-00	B010100	B079999X	RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R145	315-0560-00	B010100	B079999X	RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R150	315-0200-00			RES.,FXD,COMP:20 OHM,5%,0.25W	01121	CB2005
R151	315-0560-00	B010100	B079999X	RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R152	315-0200-00			RES.,FXD,COMP:20 OHM,5%,0.25W	01121	CB2005
R154	316-0105-00	B010100	B079999X	RES.,FXD,COMP:1M OHM,10%,0.25W	01121	CB1051
R156	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R158	315-0621-00			RES.,FXD,COMP:620 OHM,5%,0.25W	01121	CB6215
R160	311-1268-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	62PT-351-0
R162	315-0200-00			RES.,FXD,COMP:20 OHM,5%,0.25W	01121	CB2005
R164	315-0562-00			RES.,FXD,COMP:5.6K OHM,5%,0.25W	01121	CB5625
R621	321-0223-00			RES.,FXD,FILM:2.05K OHM,1%,0.125W	75042	CEAT0-2051F
R622	321-0299-00			RES.,FXD,FILM:12.7K OHM,1%,0.125W	75042	CEAT0-1272F
R630	315-0154-00			RES.,FXD,COMP:150K OHM,5%,0.25W	01121	CB1545
R631	315-0753-00			RES.,FXD,COMP:75K OHM,5%,0.25W	01121	CB7535
R633	315-0753-00			RES.,FXD,COMP:75K OHM,5%,0.25W	01121	CB7535
R634	315-0154-00			RES.,FXD,COMP:150K OHM,5%,0.25W	01121	CB1545
R635	321-0344-00			RES.,FXD,FILM:37.4K OHM,1%,0.125W	75042	CEAT0-3742F
R638	315-0154-00			RES.,FXD,COMP:150K OHM,5%,0.25W	01121	CB1545
R639	315-0753-00			RES.,FXD,COMP:75K OHM,5%,0.25W	01121	CB7535
R640	315-0753-00			RES.,FXD,COMP:75K OHM,5%,0.25W	01121	CB7535
R642	315-0513-00			RES.,FXD,COMP:51K OHM,5%,0.25W	01121	CB5135
R643	321-0344-00			RES.,FXD,FILM:37.4K OHM,1%,0.125W	75042	CEAT0-3742F

[1]Selected and added if necessary.

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R645	315-0154-00			RES.,FXD,COMP:150K OHM,5%,0.25W	01121	CB1545
R646	315-0154-00			RES.,FXD,COMP:150K OHM,5%,0.25W	01121	CB1545
R647	315-0133-00			RES.,FXD,COMP:13K OHM,5%,0.25W	01121	CB1335
R648	315-0154-00			RES.,FXD,COMP:150K OHM,5%,0.25W	01121	CB1545
R802	315-0560-00			RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R804	315-0560-00			RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R806	323-0094-00			RES.,FXD,FILM:93.1 OHM,1%,0.50W	75042	CECT0-93R10F
R808	323-0094-00			RES.,FXD,FILM:93.1 OHM,1%,0.50W	75042	CECT0-93R10F
R810	315-0111-00			RES.,FXD,COMP:110 OHM,5%,0.25W	01121	CB1115
R811	315-0111-00			RES.,FXD,COMP:110 OHM,5%,0.25W	01121	CB1115
R812	315-0560-00			RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R814	315-0560-00			RES.,FXD,COMP:56 OHM,5%,0.25W	01121	CB5605
R820	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R822	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEAT0-2001F
R824	321-0146-00			RES.,FXD,FILM:324 OHM,1%,0.125W	75042	CEAT0-3240F
R828	316-0271-00			RES.,FXD,COMP:270 OHM,10%,0.25W	01121	CB2711
R829	321-0157-00			RES.,FXD,FILM:422 OHM,1%,0.125W	75042	CEAT0-4220F
R830	316-0271-00			RES.,FXD,COMP:270 OHM,10%,0.25W	01121	CB2711
R832	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEAT0-2001F
R834	321-0146-00			RES.,FXD,FILM:324 OHM,1%,0.125W	75042	CEAT0-3240F
R840	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R846	315-0121-00			RES.,FXD,COMP:120 OHM,5%,0.25W	01121	CB1215
R860	316-0470-00			RES.,FXD,COMP:47 OHM,10%,0.25W	01121	CB4701
R880	316-0470-00			RES.,FXD,COMP:47 OHM,10%,0.25W	01121	CB4701
R890	323-0193-00			RES.,FXD,FILM:1K OHM,1%,0.5W	75042	CECT0-1001F
R892	323-0193-00			RES.,FXD,FILM:1K OHM,1%,0.5W	75042	CECT0-1001F
R902	315-0111-00			RES.,FXD,COMP:110 OHM,5%,0.25W	01121	CB1115
R904	315-0111-00			RES.,FXD,COMP:110 OHM,5%,0.25W	01121	CB1115
R906	323-0094-00			RES.,FXD,FILM:93.1 OHM,1%,0.50W	75042	CECT0-93R10F
R908	323-0094-00			RES.,FXD,FILM:93.1 OHM,1%,0.50W	75042	CECT0-93R10F
R912	315-0330-00	B010100	B049999	RES.,FXD,COMP:33 OHM,5%,0.25W	01121	CB3305
R912	315-0390-00	B050000		RES.,FXD,COMP:39 OHM,5%,0.25W	01121	CB3905
R914	315-0330-00	B010100	B049999	RES.,FXD,COMP:33 OHM,5%,0.25W	01121	CB3305
R914	315-0390-00	B050000		RES.,FXD,COMP:39 OHM,5%,0.25W	01121	CB3905
R920	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R928	316-0271-00			RES.,FXD,COMP:270 OHM,10%,0.25W	01121	CB2711
R930	316-0271-00			RES.,FXD,COMP:270 OHM,10%,0.25W	01121	CB2711
R940	315-0221-00			RES.,FXD,COMP:220 OHM,5%,0.25W	01121	CB2215
R946	315-0121-00			RES.,FXD,COMP:120 OHM,5%,0.25W	01121	CB1215
R960	315-0470-00			RES.,FXD,COMP:47 OHM,5%,0.25W	01121	CB4705
R980	316-0470-00			RES.,FXD,COMP:47 OHM,10%,0.25W	01121	CB4701
R990	323-0193-00			RES.,FXD,FILM:1K OHM,1%,0.5W	75042	CECT0-1001F
R992	323-0193-00			RES.,FXD,FILM:1K OHM,1%,0.5W	75042	CECT0-1001F
R1010	316-0470-00			RES.,FXD,COMP:47 OHM,10%,0.25W	01121	CB4701
R1012	316-0470-00			RES.,FXD,COMP:47 OHM,10%,0.25W	01121	CB4701
R1032	315-0330-00			RES.,FXD,COMP:33 OHM,5%,0.25W	01121	CB3305
R1034	315-0330-00			RES.,FXD,COMP:33 OHM,5%,0.25W	01121	CB3305
R1050	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R1052	316-0101-00			RES.,FXD,COMP:100 OHM,10%,0.25W	01121	CB1011
R1054	315-0751-00	XB070000		RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R1060	315-0272-00	B010100	B069999	RES.,FXD,COMP:2.7K OHM,5%,0.25W	01121	CB2725
R1060	315-0911-00	B070000		RES.,FXD,COMP:910 OHM,5%,0.25W	01121	CB9115
R1062	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1063	315-0751-00	B010100	B069999	RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R1063	315-0331-00	B070000		RES.,FXD,COMP:330 OHM,5%,0.25W	01121	CB3315
R1065	315-0241-00	B010100	B069999	RES.,FXD,COMP:240 OHM,5%,0.25W	01121	CB2415
R1065	315-0561-00	B070000		RES.,FXD,COMP:560 OHM,5%,0.25W	01121	CB5615
R1070	315-0302-00	B010100	B069999	RES.,FXD,COMP:3K OHM,5%,0.25W	01121	CB3025
R1070	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R1072	315-0623-00	B010100	B069999	RES.,FXD,COMP:62K OHM,5%,0.25W	01121	CB6235
R1072	315-0822-00	B070000		RES.,FXD,COMP:8.2K OHM,5%,0.25W	01121	CB8225
R1074	315-0751-00	XB070000		RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R1081	315-0241-00			RES.,FXD,COMP:240 OHM,5%,0.25W	01121	CB2415
R1083	315-0621-00			RES.,FXD,COMP:620 OHM,5%,0.25W	01121	CB6215
R1085	315-0392-00			RES.,FXD,COMP:3.9K OHM,5%,0.25W	01121	CB3925
R1311	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R1313	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R1315	315-0392-00			RES.,FXD,COMP:3.9K OHM,5%,0.25W	01121	CB3925
R1317	311-1265-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	80294	3329P-L58-202
R1319	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R1320	323-0177-00			RES.,FXD,FILM:680 OHM,1%,0.50W	75042	CECT0-6810F
R1323	323-0177-00			RES.,FXD,FILM:680 OHM,1%,0.50W	75042	CECT0-6810F
R1327	316-0822-00			RES.,FXD,COMP:8.2K OHM,10%,0.25W	01121	CB8221
R1329	316-0822-00			RES.,FXD,COMP:8.2K OHM,10%,0.25W	01121	CB8221
R1331	315-0132-00			RES.,FXD,COMP:1.3K OHM,5%,0.25W	01121	CB1325
R1332	315-0242-00			RES.,FXD,COMP:2.4K OHM,5%,0.25W	01121	CB2425
R1334	315-0121-00			RES.,FXD,COMP:120 OHM,5%,0.25W	01121	CB1215
R1336	311-0622-00			RES.,VAR,NONWIR:100 OHM,10%,0.50W	80740	62-53-5
R1338	315-0360-00			RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R1339	315-0360-00			RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R1340	315-0181-00			RES.,FXD,COMP:180 OHM,5%,0.25W	01121	CB1815
R1341	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R1343	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R1345	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3
R1347	323-0140-00			RES.,FXD,FILM:280 OHM,1%,0.50W	75042	CECT0-2800F
R1351	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R1353	311-1268-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	62PT-351-0
R1401	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R1403	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R1413	315-0272-00			RES.,FXD,COMP:2.7K OHM,5%,0.25W	01121	CB2725
R1416	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R1418	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R1419	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R1420	323-0198-00	B010100	B019999	RES.,FXD,FILM:1.13K OHM,1%,0.50W		
R1420	323-0197-00	B020000		RES.,FXD,FILM:1.1K OHM,1%,0.50W	75042	CECT0-1101F
R1421	323-0198-00	B010100	B019999	RES.,FXD,FILM:1.13K OHM,1%,0.50W		
R1421	323-0197-00	B020000		RES.,FXD,FILM:1.1K OHM,1%,0.50W	75042	CECT0-1101F
R1422	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R1423A,B	311-1465-01			RES.,VAR,NONWIR:1K OHM X 2.5K OHM,10%,0.50W		
R1425	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R1430	315-0360-00	XB020000		RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R1431	315-0162-00	B010100	B029999	RES.,FXD,COMP:1.6K OHM,5%,0.25W	01121	CB1625
R1431	315-0122-00	B030000		RES.,FXD,COMP:1.2K OHM,(NOM VALUE),SEL	01121	CB1225
R1432	315-0360-00	XB020000		RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R1434	315-0182-00			RES.,FXD,COMP:1.8K OHM,5%,0.25W	01121	CB1825
R1435	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1436	311-1269-00			RES.,VAR,NONWIR:20K OHM,10%,0.50W	73138	62PT-352-0
R1465[1]	311-1320-00			RES.,VAR,NONWIR:5K OHM,10%,1W		
R1466	316-0273-00			RES.,FXD,COMP:27K OHM,10%,0.25W	01121	CB2731
R1467	316-0273-00			RES.,FXD,COMP:27K OHM,10%,0.25W	01121	CB2731
R1470	315-0561-00			RES.,FXD,COMP:560 OHM,5%,0.25W	01121	CB5615
R1472	315-0183-00			RES.,FXD,COMP:18K OHM,5%,0.25W	01121	CB1835
R1474	315-0331-00			RES.,FXD,COMP:330 OHM,5%,0.25W	01121	CB3315
R1490	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R1492	315-0183-00			RES.,FXD,COMP:18K OHM,5%,0.25W	01121	CB1835
R1494	315-0331-00			RES.,FXD,COMP:330 OHM,5%,0.25W	01121	CB3315
R1498	315-0911-00			RES.,FXD,COMP:910 OHM,5%,0.25W	01121	CB9115
R1511	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1511	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R1512	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1512	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R1514	315-0152-00	B010100	B069999	RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R1514	315-0751-00	B070000		RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R1516	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1516	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R1517	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1517	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R1519	315-0152-00	B010100	B069999	RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R1519	315-0751-00	B070000		RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R1520	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R1523	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R1531	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3
R1533	315-0332-00			RES.,FXD,COMP:3.3K OHM,5%,0.25W	01121	CB3325
R1701	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R1703	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R1705	323-0119-00			RES.,FXD,FILM:169 OHM,1%,0.50W	75042	CECT0-1690F
R1711	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1712	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1714	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R1716	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1717	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R1719	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R1720	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R1721	315-0270-00	XB050000		RES.,FXD,COMP:27 OHM,5%,0.25W	01121	CB2705
R1723	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R2313	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R2315	315-0392-00			RES.,FXD,COMP:3.9K OHM,5%,0.25W	01121	CB3925
R2317	311-1265-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	80294	3329P-L58-202
R2319	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R2320	323-0177-00			RES.,FXD,FILM:680 OHM,1%,0.50W	75042	CECT0-6810F
R2323	323-0177-00			RES.,FXD,FILM:680 OHM,1%,0.50W	75042	CECT0-6810F
R2327	316-0822-00			RES.,FXD,COMP:8.2K OHM,10%,0.25W	01121	CB8221
R2329	316-0822-00			RES.,FXD,COMP:8.2K OHM,10%,0.25W	01121	CB8221
R2331	315-0132-00			RES.,FXD,COMP:1.3K OHM,5%,0.25W	01121	CB1325
R2332	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2334	315-0121-00			RES.,FXD,COMP:120 OHM,5%,0.25W	01121	CB1215
R2336	311-0622-00			RES.,VAR,NONWIR:100 OHM,10%,0.50W	80740	62-53-5
R2338	315-0360-00			RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R2339	315-0360-00			RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605

[1]Furnished as a unit with S1465.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R2340	315-0181-00			RES.,FXD,COMP:180 OHM,5%,0.25W	01121	CB1815
R2341	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R2343	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R2345	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3
R2347	323-0140-00			RES.,FXD,FILM:280 OHM,1%,0.50W	75042	CECT0-2800F
R2351	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R2353	311-1268-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	62PT-351-0
R2401	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R2403	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R2410	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R2411	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	80740	62-56-3
R2413	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R2415	315-0162-00	B010100	B029999	RES.,FXD,COMP:1.6K OHM,5%,0.25W	01121	CB1625
R2415	315-0162-00	B030000		RES.,FXD,COMP:1.6K OHM,(NOM VALUE),SEL	01121	CB1625
R2416	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R2418	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R2419	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R1420	323-0198-00	B010100	B019999	RES.,FXD,FILM:1.13K OHM,1%,0.50W		
R2420	323-0197-00	B020000		RES.,FXD,FILM:1.1K OHM,1%,0.50W	75042	CECT0-1101F
R2421	323-0198-00	B010100	B019999	RES.,FXD,FILM:1.13K OHM,1%,0.50W		
R2421	323-0197-00	B020000		RES.,FXD,FILM:1.1K OHM,1%,0.50W	75042	CECT0-1101F
R2422	315-0202-00	B010100	B029999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2422	315-0182-00	B030000		RES.,FXD,COMP:1.8K OHM,5%,0.25W	01121	CB1825
R2423A,B	311-1465-00			RES.,VAR,NONWIR:1K OHM X 2.5K OHM,10%,0.50W		
R2425	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R2430	315-0360-00	XB020000		RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R2431	315-0162-00	B010100	B029999	RES.,FXD,COMP:1.6K OHM,5%,0.25W	01121	CB1625
R2431	315-0122-00	B030000		RES.,FXD,COMP:1.2K OHM,(NOM VALUE),SEL	01121	CB1225
R2432	315-0360-00	XB020000		RES.,FXD,COMP:36 OHM,5%,0.25W	01121	CB3605
R2434	315-0182-00			RES.,FXD,COMP:1.8K OHM,5%,0.25W	01121	CB1825
R2435	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3
R2436	311-1269-00			RES.,VAR,NONWIR:20K OHM,10%,0.50W	73138	62PT-352-0
R2465[1]	311-1320-00			RES.,VAR,NONWIR:5K OHM,10%,1W		
R2466	316-0273-00			RES.,FXD,COMP:27K OHM,10%,0.25W	01121	CB2731
R2467	316-0273-00			RES.,FXD,COMP:27K OHM,10%,0.25W	01121	CB2731
R2470	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R2472	315-0183-00			RES.,FXD,COMP:18K OHM,5%,0.25W	01121	CB1835
R2474	315-0331-00			RES.,FXD,COMP:330 OHM,5%,0.25W	01121	CB3315
R2476	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2490	315-0561-00			RES.,FXD,COMP:560 OHM,5%,0.25W	01121	CB5615
R2492	315-0183-00			RES.,FXD,COMP:18K OHM,5%,0.25W	01121	CB1835
R2494	315-0331-00			RES.,FXD,COMP:330 OHM,5%,0.25W	01121	CB3315
R2496	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2498	315-0911-00			RES.,FXD,COMP:910 OHM,5%,0.25W	01121	CB9115
R2511	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2511	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R2512	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2515	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R2514	315-0152-00	B010100	B069999	RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R2514	315-0751-00	B070000		RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R2516	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2516	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R2517	315-0202-00	B010100	B069999	RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025

[1]Furnished as a unit with S2465.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R2517	315-0102-00	B070000		RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R2519	315-0152-00	B010100	B069999	RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R2519	315-0751-00	B070000		RES.,FXD,COMP:750 OHM,5%,0.25W	01121	CB7515
R2520	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R2523	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R2531	311-0978-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3
R2533	315-0242-00			RES.,FXD,COMP:2.4K OHM,5%,0.25W	01121	CB2425
R2701	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R2703	321-0076-00			RES.,FXD,FILM:60.4 OHM,1%,0.125W	75042	CEAT0-60R40F
R2705	323-0119-00			RES.,FXD,FILM:169 OHM,1%,0.50W	75042	CECT0-1690F
R2711	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2712	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2714	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R2716	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2717	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R2719	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R2720	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R2721	315-0270-00	XB050000		RES.,FXD,COMP:27 OHM,5%,0.25W	01121	CB2705
R2723	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
RT1334	307-0125-00			RES.,THERMAL:500 OHM,10%,25 DEG C	50157	2D1595
RT1433	307-0125-00			RES.,THERMAL:500 OHM,10%,25 DEG C	50157	2D1595
RT2334	307-0125-00			RES.,THERMAL:500 OHM,10%,25 DEG C	50157	2D1595
RT2433	307-0125-00			RES.,THERMAL:500 OHM,10%,25 DEG C	50157	2D1595
S22A,B	260-0816-00			SWITCH,SLIDE:POLARITY CH2	79727	GF-126-0012A
S30A,B	260-1493-00			SWITCH,ROTARY:DISPLAY MODE/TRIG SOURCE		
S30A,B	262-0965-00	B010100	B069999	SWITCH,ROTARY:DISPLAY MODE/TRIG SOURCE		
S30A,B	262-0965-01	B070000		SWITCH,ROTARY:DISPLAY MODE/TRIG SOURCE		
S32	260-0816-00			SWITCH,SLIDE:BW	79727	GF-126-0012A
S100A[1]				AC/GND/DC		
S100B[1]				VOLTS/DIV		
S100C[1]				VOLTS/DIV		
S1423A[2]	311-1465-01					
S1423A	262-0966-00			SWITCH,PUSH:VARIABLE(CALIN) CH1		
S1465[3]				IDENTIFY,CH1		
S2423A[4]	311-1465-01					
S2423A	262-0966-00			SWITCH,PUSH:VARIABLE(CALIN) CH2		
S2465[5]				IDENTIFY,CH2		
T11	276-0525-00			CORE,FERRITE:0.196 ID X 0.437"OD	01121	T037C351A
T12	276-0525-00			CORE,FERRITE:0.196 ID X 0.437"OD	01121	T037C351A
T1301	120-0286-00			XFMR,TOROID:2 TURNS,BIFILAR	80009	120-0286-00
T2301	120-0286-00			XFMR,TOROID:2 TURNS,BIFILAR	80009	120-0286-00
U1350	155-0078-07	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-07
U1350[6]	155-0078-03	B020000		MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-03
U1450	155-0078-07	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-07
U1450[6]	155-0078-03	B020000		MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-03
U1550	155-0078-05	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-05
U1550[7]	155-0078-01	B020000		MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-01
U1750	155-0078-05	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-05
U1750[7]	155-0078-01	B020000		MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-01
U2350	155-0078-07	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-07
U2350[6]	155-0078-03	B020000		MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-03
U2450	155-0078-07	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-07

[1]See Mechanical Parts List for replacement parts.
[2]Furnished as a unit with R1423A,B.
[3]Furnished as a unit with R1465.
[4]Furnished as a unit with R2423A,B.
[5]Furnished as a unit with R2465.
[6]155-0078-00, -03, -04, or -07 may be used.
[7]155-0078-01, -03, -04, -05, or -07 may be used.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U2450[1]	155-0078-03	B020000	B029999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-03
U2450[1]	155-0078-00	B030000		MICROCIRCUIT,LI:ML,VERT AMPL	80009	155-0078-00
U2550	155-0078-05	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-05
U2250[2]	155-0078-01	B020000		MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-01
U2750	155-0078-05	B010100	B019999	MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-05
U2750[2]	155-0078-01	B020000		MICROCIRCUIT,LI:ML,VERT AMPL,SEL	80009	155-0078-01

[1]155-0078-00, -03, -04, or -07 may be used.
[2]155-0078-01, -03, -04, -05, or -07 may be used.

SECTION 7

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols and Reference Designators

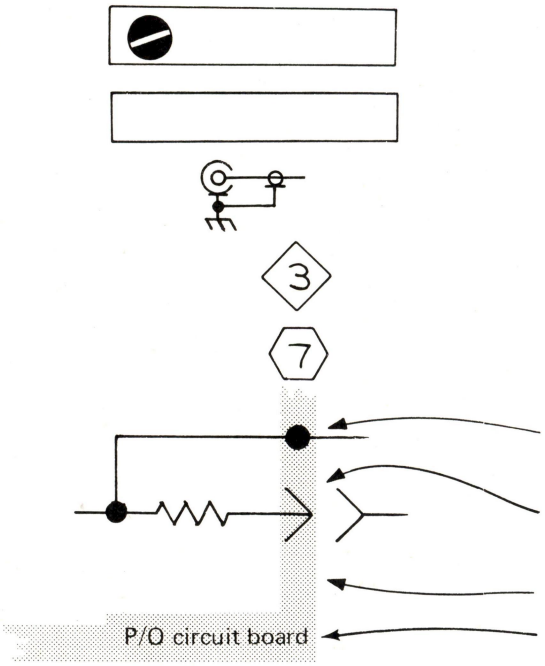
Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).
Resistors = Ohms (Ω)

Symbols used on the diagrams are based on USA Standard Y32.2-1970.

Logic symbology is based on MIL-STD-806B in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following special symbols are used on the diagrams:



External Screwdriver adjustment.

External control or connector.

Coax connector with grounded shield.

Refer to diagram number indicated in diamond.

Refer to waveform number indicated in hexagon.

Connection soldered to circuit board.

Connection made to circuit board with interconnecting pin.

Blue tint encloses components located on circuit board.

Designates part of a complete circuit board.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc.)
AT	Attenuator, fixed or variable
B	Motor
BT	Battery
C	Capacitor, fixed or variable
CR	Diode, signal or rectifier
DL	Delay line
DS	Indicating device (lamp)
F	Fuse
FL	Filter
H	Heat dissipating device (heat sink, heat radiator, etc.)
HR	Heater
J	Connector, stationary portion
K	Relay
L	Inductor, fixed or variable
LR	Inductor/resistor combination
M	Meter
Q	Transistor or silicon-controlled rectifier
P	Connector, movable portion
R	Resistor, fixed or variable
RT	Thermistor
S	Switch
T	Transformer
TP	Test point
U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
V	Electron tube
VR	Voltage regulator (zener diode, etc.)
Y	Crystal
CW	Clockwise control rotation

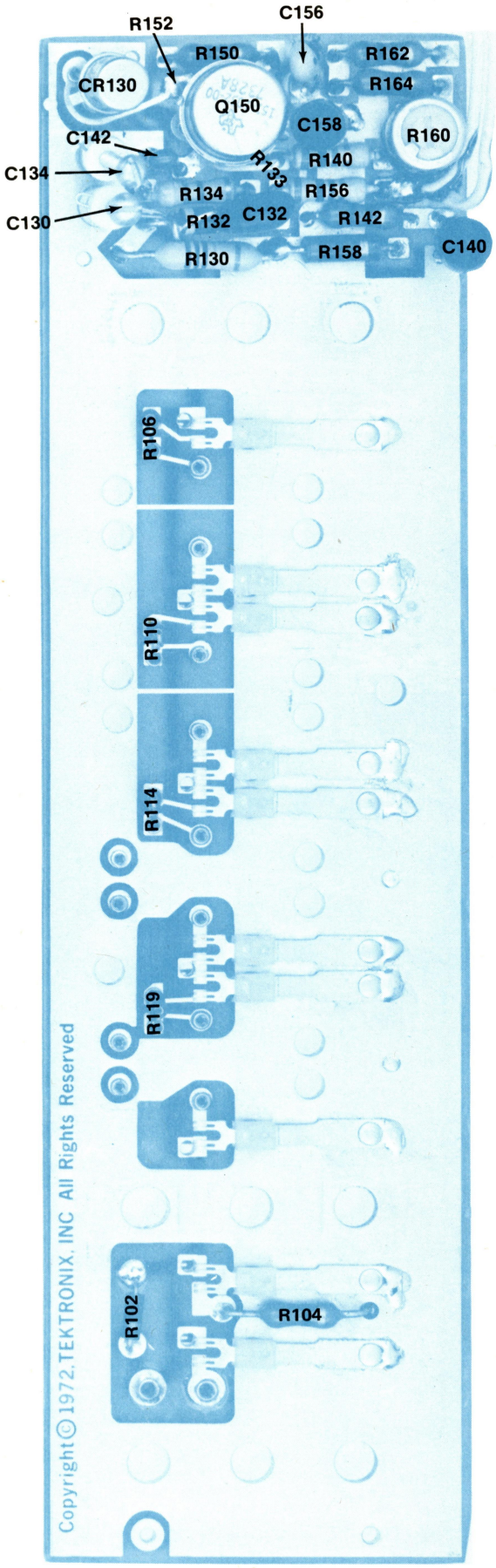
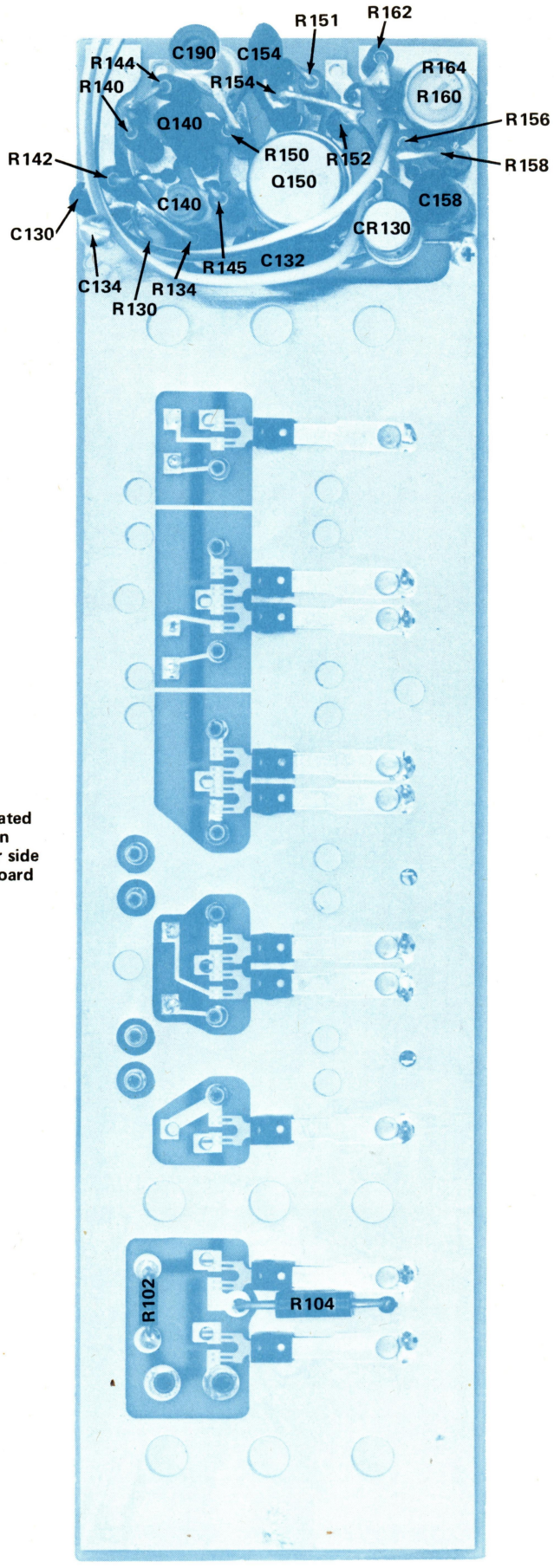


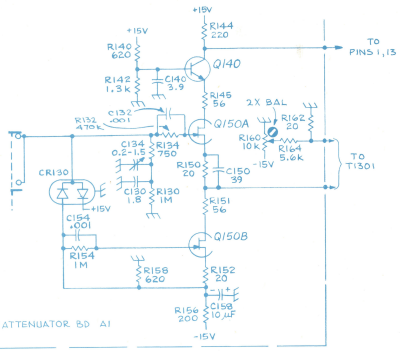
Fig. 7-1a. 7A26 Attenuator Board (SN B080000-up)

R118, R115 } Located on other side of board

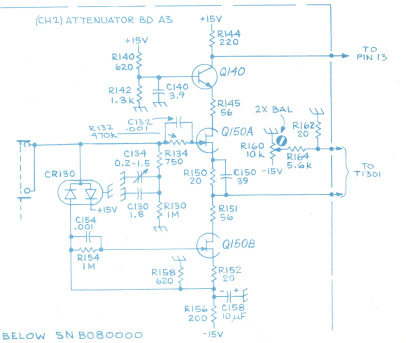


REV. B, SEPT 1974

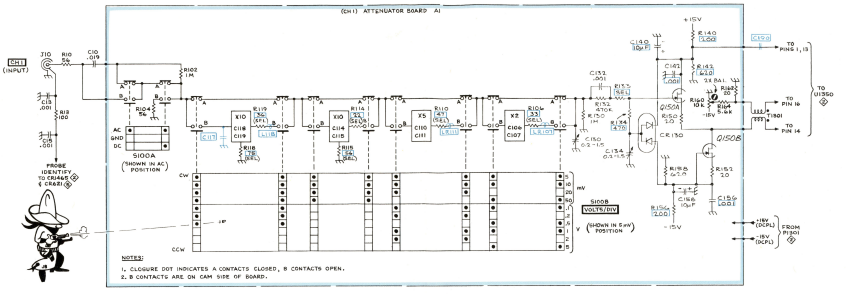
Fig. 7-1b. 7A26 Attenuator Board (Below SN B080000)

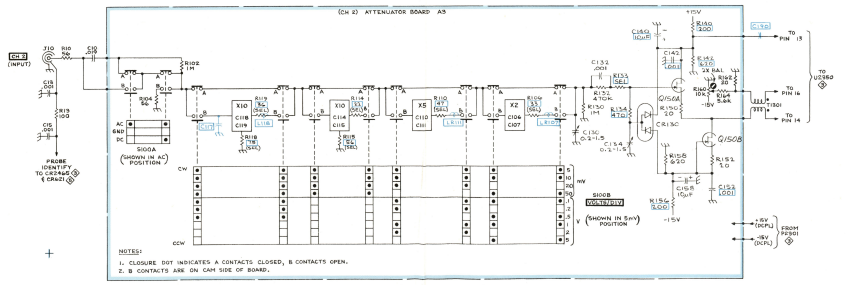


(CH1) ATTENUATOR BD A1



EFF. BELOW SN B080000





7A26

REV. B, SEPT 1974

CH 1 & CH 2 ATTENUATORS ①

klf 10 72

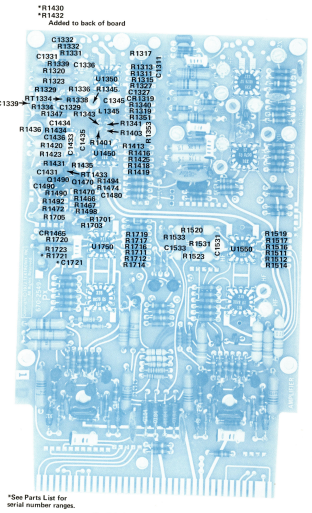
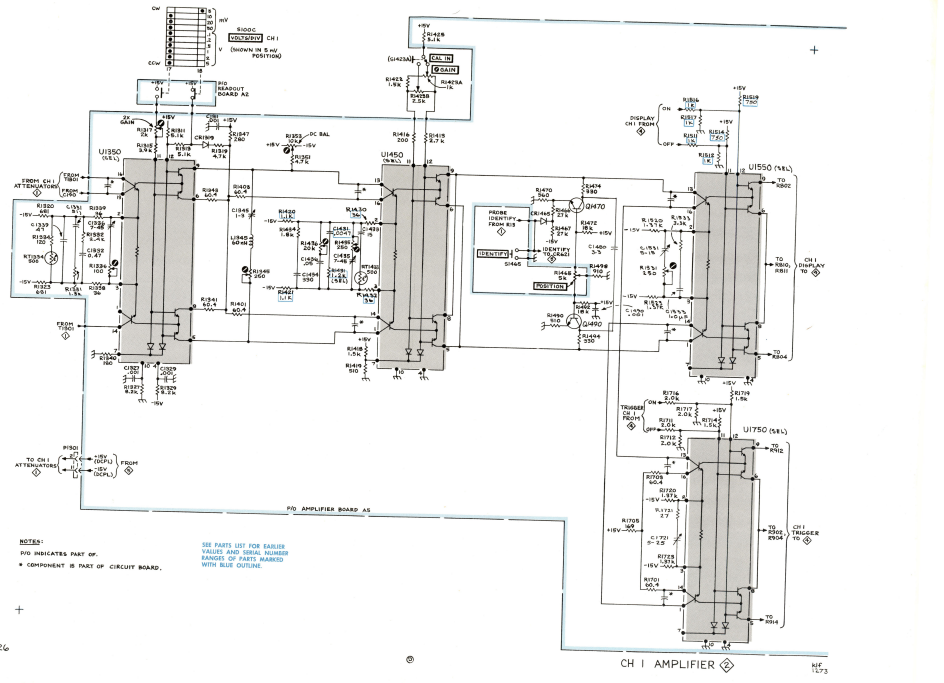


Fig. 7-2. Partial 7A26 Amplifier Board.



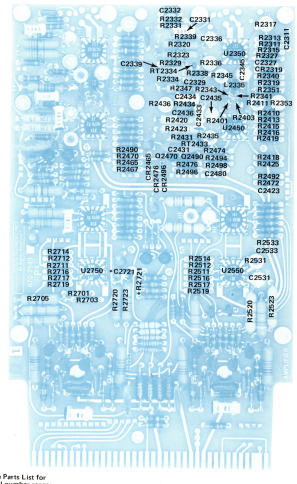
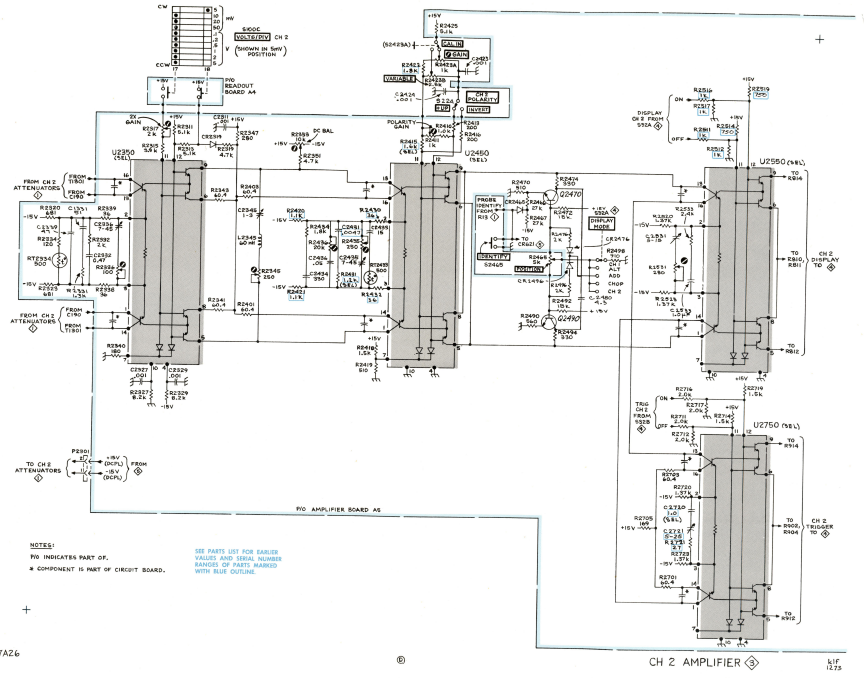


Fig. 7-3. Partial 7A26 Amplifier Board.

©



©

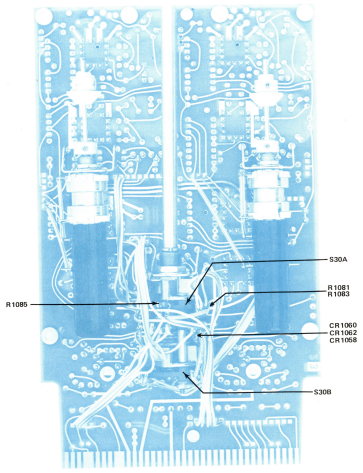


Fig. 7-4. Rear View 7A26 Amplifier Board.

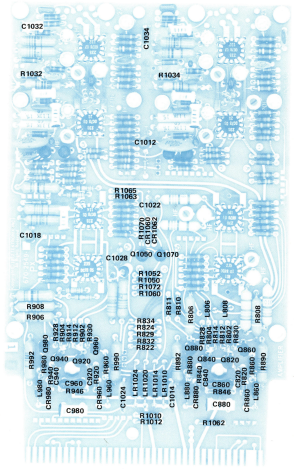
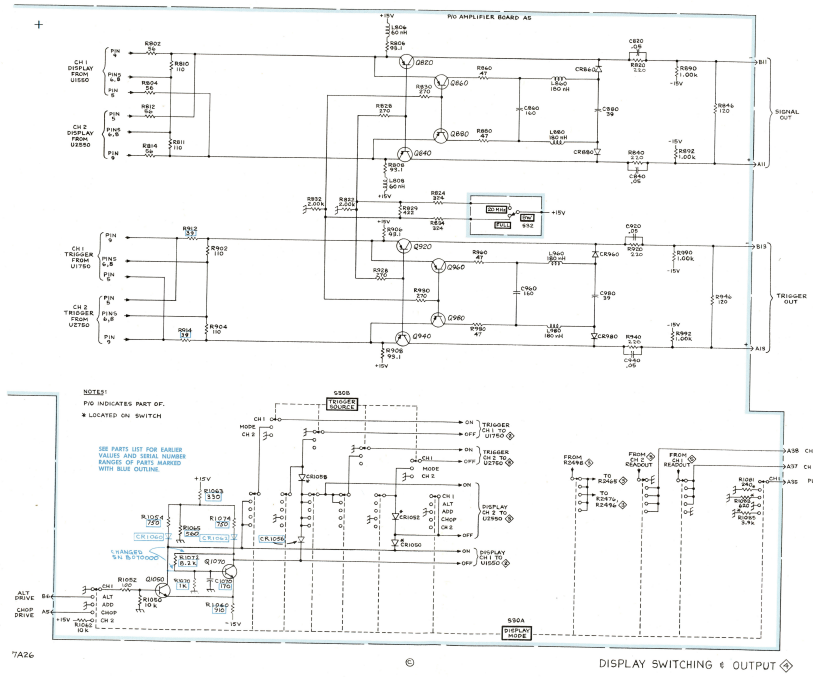


Fig. 7-5. Partial 7A26 Amplifier Board.



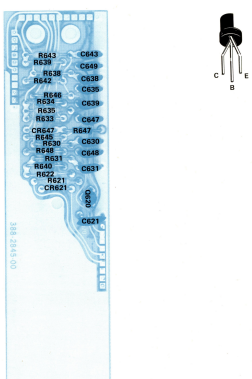
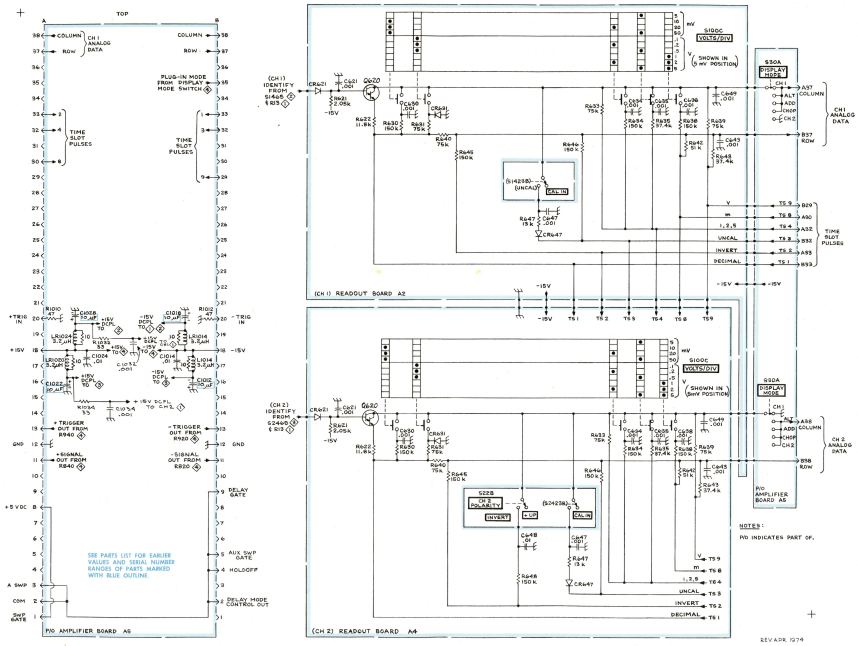


Fig. 7-6. 7A26 Readout Board.



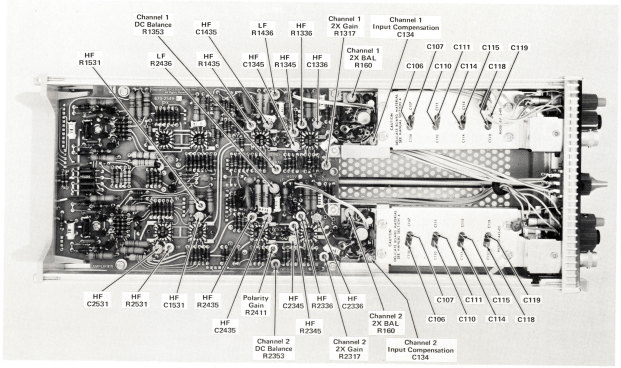


Fig. 7-7. Location of Adjustments.

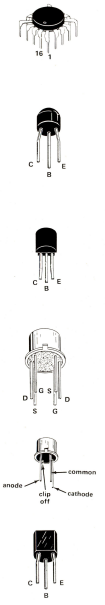
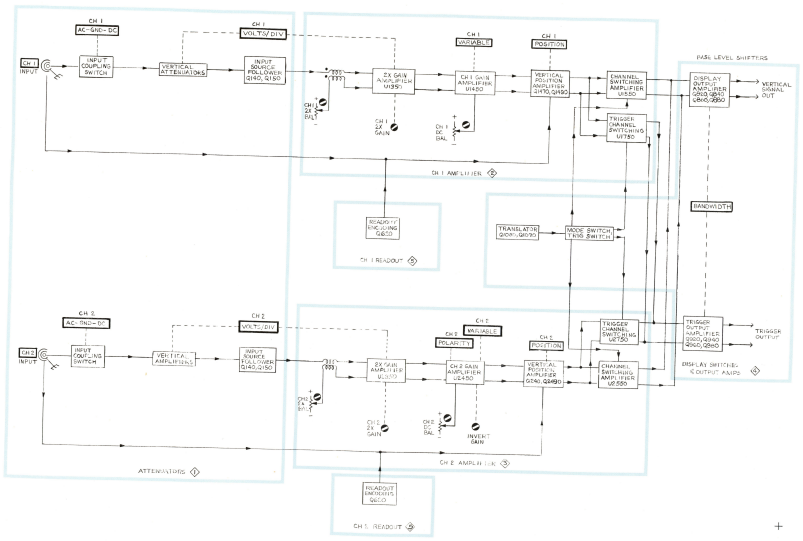


Fig. 7-8. Semiconductor Electrode Configurations.



7A26

BLOCK DIAGRAM

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
\- - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
\- - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
\- - - * - - -

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH
#	NUMBER SIZE
ACTR	ACTUATOR
ADPTR	ADAPTER
ALIGN	ALIGNMENT
AL	ALUMINUM
ASSEM	ASSEMBLED
ASSY	ASSEMBLY
ATTEN	ATTENUATOR
AWG	AMERICAN WIRE GAGE
BD	BOARD
BRKT	BRACKET
BRS	BRASS
BRZ	BRONZE
BSHG	BUSHING
CAB	CABINET
CAP	CAPACITOR
CER	CERAMIC
CHAS	CHASSIS
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
COV	COVER
CPLG	COUPLING
CRT	CATHODE RAY TUBE
DEG	DEGREE
DWR	DRAWER
ELCTRN	ELECTRON
ELEC	ELECTRICAL
ELCTLT	ELECTROLYTIC
ELEM	ELEMENT
EPL	ELECTRICAL PARTS LIST
EQPT	EQUIPMENT
EXT	EXTERNAL
FIL	FILLISTER HEAD
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FR	FRAME or FRONT
FSTNR	FASTENER
FT	FOOT
FXD	FIXED
GSKT	GASKET
HDL	HANDLE
HEX	HEXAGON
HEX HD	HEXAGONAL HEAD
HEX SOC	HEXAGONAL SOCKET
HLCPS	HELICAL COMPRESSION
HLEXT	HELICAL EXTENSION
HV	HIGH VOLTAGE
IC	INTEGRATED CIRCUIT
ID	INSIDE DIAMETER
IDENT	IDENTIFICATION
IMPLR	IMPELLER
IN	INCH
INCAND	INCANDESCENT
INSUL	INSULATOR
INTL	INTERNAL
LPHLDR	LAMPHOLDER
MACH	MACHINE
MECH	MECHANICAL
MTG	MOUNTING
NIP	NIPPLE
NON WIRE	NOT WIRE WOUND
OBD	ORDER BY DESCRIPTION
OD	OUTSIDE DIAMETER
OVH	OVAL HEAD
PH BRZ	PHOSPHOR BRONZE
PL	PLAIN or PLATE
PLSTC	PLASTIC
PN	PART NUMBER
PNH	PAN HEAD
PWR	POWER
RCPT	RECEPTACLE
RES	RESISTOR
RGD	RIGID
RLF	RELIEF
RTNR	RETAINER
SCH	SOCKET HEAD
SCOPE	OSCILLOSCOPE
SCR	SCREW
SE	SINGLE END
SECT	SECTION
SEMICOND	SEMICONDUCTOR
SHLD	SHIELD
SHLDR	SHOULDERED
SKT	SOCKET
SL	SLIDE
SLFLKG	SELF-LOCKING
SLVG	SLEEVING
SPR	SPRING
SQ	SQUARE
SST	STAINLESS STEEL
STL	STEEL
SW	SWITCH
T	TUBE
TERM	TERMINAL
THD	THREAD
THK	THICK
TNSN	TENSION
TPG	TAPPING
TRH	TRUSS HEAD
V	VOLTAGE
VAR	VARIABLE
W/	WITH
WSHR	WASHER
XFMR	TRANSFORMER
XSTR	TRANSISTOR

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

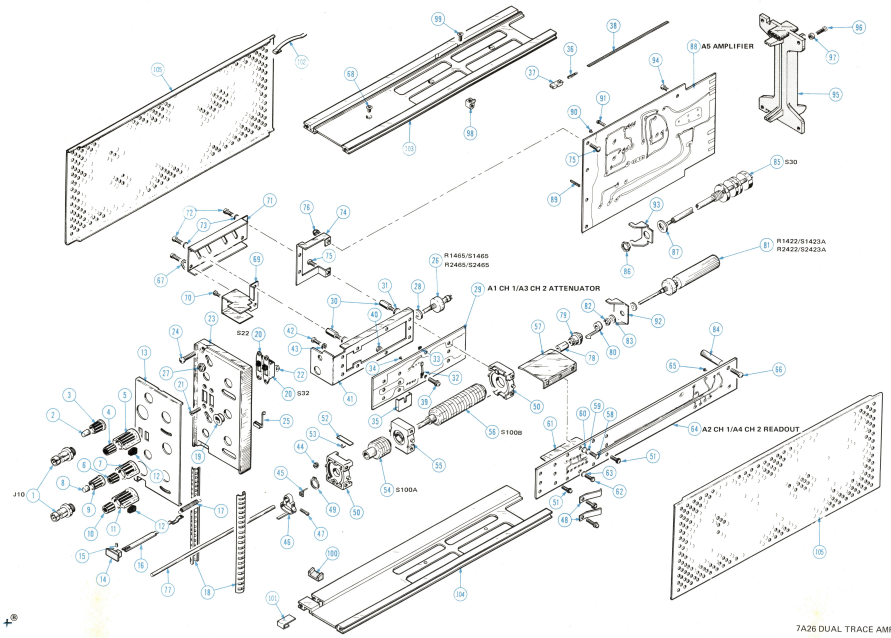
MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00779	AMP, Inc.	P. O. Box 3608	Harrisburg, PA 17105
08261	Spectra-Strip Corp.	7100 Lampson Ave.	Garden Grove, CA 92642
12360	Albany Products Co., Div. of Pneumo Dynamics Corp.	351 Connecticut Ave.	South Norwalk, CT 06856
13257	Amerace Ltd.	10 Esna Park Dr.	Markham, Ontario, Canada
22526	Berg Electronics, Inc.	Youk Expressway	New Cumberland, PA 17070
23499	Gavitt Wire and Cable, Division of RSC Industries, Inc.	455 N. Quince St.	Escondido, CA 92025
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
42838	National Rivet and Mfg. Co.	1-21 East Jefferson St.	Waupun, WI 53963
70276	Allen Mfg. Co.	P. O. Drawer 570	Hartford, CT 06101
70278	Allied Steel and Conveyors, Div. of Sparton Corp.	17333 Healy	Detroit, MI 48212
73743	Fischer Special Mfg. Co.	446 Morgan St.	Cincinnati, OH 45206
74445	Holo-Krome Co.	31 Brook St. West	Hartford, CT 06110
78189	Illinois Tool Works, Inc. Shakeproof Division	St. Charles Road	Elgin, IL 60120
79727	C-W Industries	550 Davisville Rd.	Warminster, PA 18974
79807	Wrought Washer Mfg. Co.	2100 S. O Bay St.	Milwaukee, WI 53207
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97077
83385	Central Screw Co.	2530 Crescent Dr.	Broadview, IL 60153
83501	Gavitt Wire and Cable, Division of RSC Industries, Inc.	Central St.	Brookfield, MA 01506
87308	N. L. Industries, Inc., Southern Screw Div.	P. O. Box 1360	Statesville, NC 28677
97464	Industrial Retaining Ring Co.	57 Cordier St.	Irvington, NJ 07111

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-1	131-0679-00			2	CONNECTOR,RCPT,:BNC W/HARDWARE	24931	28JR168-1
-2	366-1059-00			1	PUSH BUTTON:GRAY	80009	366-1059-00
-3	366-1077-00			1	KNOB:GRAY	80009	366-1077-00
	213-0153-00			1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-4	366-1308-00			1	KNOB:RED	80009	366-1308-00
	213-0153-00			1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-5	366-1299-00			1	KNOB:GRAY	80009	366-1299-00
	213-0153-00			2	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-6	366-1163-00			1	KNOB:LIGHT GRAY	80009	366-1163-00
	213-0153-00			1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-7	366-1165-00			1	KNOB:GRAY	80009	366-1165-00
	213-0153-00			2	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-8	366-1059-00			1	PUSH BUTTON:GRAY	80009	366-1059-00
-9	366-1077-00			1	KNOB:GRAY	80009	366-1077-00
	213-0153-00			1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-10	366-1308-00			1	KNOB:RED	80009	366-1308-00
	213-0153-00			1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-11	366-1299-00			1	KNOB:GRAY	80009	366-1299-00
	213-0153-00			2	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-12	366-0215-02			2	KNOB:LEVER SWITCH	80009	366-0215-02
-13	333-1594-00			1	PANEL,FRONT		
-14	366-1058-45			1	KNOB,LATCH		
					(ATTACHING PARTS)		
-15	214-1095-00			1	PIN,SPG,SPLIT:0.094 OD X 0.187 INCH LONG	13257	52-022-094-0187
-16	105-0076-00			1	REL BAR,LATCH:PLUG-IN UNIT	80009	105-0076-00
					- - - * - - -		
-17	214-1280-00			1	SPRING,HLCPS:0.14 OD X 1.126"L,0.16"DIA W	80009	214-1280-00
-18	348-0235-00			2	SHLD GSKT,ELEC:4.734 INCH LONG	80009	348-0235-00
-19	358-0216-00			1	BUSHING,PLASTIC:0.257 ID X 0.412 INCH OD	80009	358-0216-00
-20	260-0816-00			2	SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF-126-0012A
					(ATTACHING PARTS)		
-21	211-0030-00			2	SCREW,MACHINE:2-56 X 0.25"82 DEG,FLH STL	83385	OBD
-22	210-0404-00			2	NUT,HEX.,2-56 X 0.188 INCH		
					- - - * - - -		
-23	386-1447-52			1	SUBPANEL,FRONT		
					(ATTACHING PARTS)		
-24	213-0192-00			4	SCR,TPG,THD FOR:6-32 X 0.50 INCH,PNH STL	87308	OBD
					- - - * - - -		
-25	131-1075-00			1	CONTACT,ELECTRICAL		
-26	----- -----			2	RESISTOR,VAR.,(SEE R1465/S1465 & R2465/S2465)		
					(ATTACHING PARTS FOR EACH)		
-27	210-0583-00			1	NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20319-402
-28	210-0046-00			1	WASHER,LOCK:INTL,0.26 ID X 0.40" OD,STL	78189	1214-05-00-0541C
					- - - * - - -		
	672-0051-00	B010100	B059999	2	CKT BOARD ASSY:ATTENUATOR/READOUT		
	672-0051-01	B060000	B079999	2	CKT BOARD ASSY:ATTENUATOR/READOUT		
	672-0051-02	B080000		2	CKT BOARD ASSY:ATTENUATOR/READOUT		
-29	----- -----			1	. CKT BD ASSY:ATTEN(SEE A1 CH1 & A3 CH 2 EPL)		
-30	129-0299-00			4	. . POST,ELEC-MECH:HEX,0.333 INCH LONG	80009	129-0299-00
					(ATTACHING PARTS)		
-31	210-0004-00			1	. . WASHER,LOCK:INTL,0.12 ID X 0.26"OD,STL	78189	1204-00-00-0541C
	210-0406-00			1	. . NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
					- - - * - - -		
-32	131-1030-00			10	. . CONTACT ASSY,EL:CAM SWITCH,BOTTOM	80009	131-1030-00
-33	131-1031-00			17	. . CONTACT ASSY,EL:CAM SWITCH,TOP	80009	131-1031-00
-34	210-0779-00			17	. . RIVET,TUBULAR:0.051 OD X 0.115 INCH LONG	42838	RA-29952715
	136-0252-01	B010100	B079999	14	. . CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
	136-2 52-01	B080000		22	. . CONTACT,ELEC:0.178 INCH LONG	00779	1-332094-02
	136-0333-00			2	. . CONTACT,ELEC:0.138 INCH LONG	00779	1-331677-4
-35	337-1406-00			1	. . SHLD,ELECTRICAL:CAM CONTACTS	80009	337-1406-00
-36	131-0707-00			2	. . CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	47439
-37	352-0169-00			1	. . HOLDER,TERM.CON:2 WIRE BLACK	80009	352-0169-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-38	175-0825-00			FT	. . WIRE,ELECTRICAL:2 WIRE RIBBON	23499	TEK_175-0825-00
					(ATTACHING PARTS FOR CKT BD)		
-39	211-0001-00			3	. SCREW,MACHINE:2-56 X 0.25 INCH,PNH STL	83385	OBD
	210-0053-00			3	. WASHER,LOCK:INTL,0.092 ID X 0.175"OD,STL	83385	OBD
-40	210-0405-00			3	. NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	2X12157-402
					- - - * - - -		
-41	441-1097-00			1	. CHASSIS,ATTENUATOR		
					(ATTACHING PARTS)		
-42	121-0097-00			2	. SCREW,4-40 X 0.312 INCH,PHS		
-43	210-0004-00			2	. WASHER,LOCK:INTL,0.12 ID X 0.26"OD,STL	78189	1204-00-00-0541C
-44	210-0406-00			2	. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
					- - - * - - -		
-45	131-0963-00			2	. CONTACT,ELEC:GROUNDING	80009	131-0963-00
-46	105-0243-00			1	. ACTUATOR,SWITCH:	80009	105-0243-00
					(ATTACHING PARTS)		
-47	213-0214-00			1	. SCREW,CAP SCH:2-56 X 0.375"HEX HD STL	70278	OBD
					- - - * - - - -		
-48	131-0907-00			2	. CONTACT,ELECTRICAL,GROUNDING		
	263-1018-00	XB060000	B070000	1	. ACTUATOR ASSEMBLY,CAM SWITCH		
	263-1018-01	B080000		1	. ACTUATOR ASSEMBLY,CAM SWITCH		
-49	354-0391-00	B010100	B059999	2	. . RING,RETAINING:0.395"FREE ID X 0.025" STL	97464	3100-43-CD
	354-0390-00	B060000		1	. . RING,RETAINING		
	354-0443-00	B060000		1	. . RING,RETAINING		
-50	401-0081-02	B010100	B059999	2	. . BEARING,CAM SW:FRONT	80009	401-0081-02
	401-0180-00	B060000	B079999	2	. . BEARING,CAM SWITCH		
	401-0180-00	B080000		1	. . BEARING,CAM SWITCH		
	401-0180-02	B080000		1	. . BEARING,CAM SWITCH		
					(ATTACHING PARTS)		
-51	211-0116-00			2	. . SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
					- - - * - - -		
-52	214-1139-00			-	. . SPRING,FLAT:GOLD COLORED	80009	214-1139-00
	214-1139-02			-	. . SPRING,FLAT:GREEN COLORED	80009	214-1139-02
	214-1139-03			-	. . SPRING,FLAT:RED COLORED	80009	214-1139-03
-53	214-1127-00	B010100	B059999	4	. . ROLLER,DETENT:0.125 DIA X 0.125 INCH L	80009	214-1127-00
	214-1752-00	B060000		4	. . ROLLER,DETENT		
-54	105-0397-00	B010100	B059999	1	. . ACTUATOR,CAM SW--AC GND DC(S100A)		
	105-0397-01	B060000		1	. . ACTUATOR,CAM SW--AC GND DC(S100A)		
-55	401-0115-00	B010100	B059999	1	. . BEARING,CAM SW:CENTER	80009	401-0115-00
	401-0178-00	B060000		1	. . BEARING,CAM SW		
					(ATTACHING PARTS)		
	211-0116-00			2	. . SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
					- - - * - - -		
-56	105-0398-00	B010100	B059999	1	. . ACTUATOR,CAM SW--VOLTS/DIV (S100B)		
	105-0398-01	B060000		1	. . ACTUATOR,CAM SW--VOLTS/DIV (S100B)		
	384-0880-00	XB060000		1	. . SHAFT,W/DRIVER		
	384-0878-01	XB060000		1	. . SHAFT,W/DRIVER		
-57	337-1754-00			1	. SHIELD,ELECTRICAL		
					(ATTACHING PARTS)		
-58	213-00120-0			3	. SCREW,THREAD FORMING,2-32 X 0.25 INCH,PHS		
-59	210-0053-00			3	. WASHER,LOCK:INTL,0.092 ID X 0.175"OD,STL	83385	OBD
-60	210-1008-00			3	. WASHER,FLAT:0.09 ID X 0.188" OD,BRS	12360	OBD
					- - - * - - -		
-61	337-1418-01			1	. SHIELD,ELECTRICAL		
					(ATTACHING PARTS)		
-62	213-0277-00			3	. SCR,TPG,THD FOR:2-56 X 0.312 INCH,PNH STL	83385	NOTE
	210-0053-00			3	. WASHER,LOCK:INTL,0.092 ID X 0.175"OD,STL	83385	OBD
-63	210-1008-00			3	. WASHER,FLAT:0.09 ID X 0.188" OD,BRS	12360	OBD
					- - - * - - -		
-64	----- -----			1	. CKT BOARD ASSY:READOUT(SEE A2 & A4 EPL)		
-65	136-0252-04			3	. . CONTACT,ELEC:0.188 INCH LONG	22526	75060
					(ATTACHING PARTS FOR CKT BD)		
-66	211-0007-00			1	. SCREW,MACHINE:4-40 X 0.188 INCH,PNH STL	83385	OBD
					- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-67	210-0288-00			2	TERMINAL,LUG,0.125 ID X 1.125 INCHES LONG		
					(ATTACHING PARTS)		
-68	211-0105-00			1	SCREW,MACHINE:4-40 X 0.188"100 DEG,FLH STL	83385	OBD
	210-0586-00			1	NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
					- - - * - - -		
-69	337-1716-00			2	SHIELD,ELECTRICAL		
					(ATTACHING PARTS)		
-70	213-0055-00			1	SCR,TPG,THD FOR:2-32 X 0.188 INCH,PNH STL	83385	OBD
					- - - * - - -		
-71	200-1442-00			2	COVER,ATTENUATOR CHASSIS		
					(ATTACHING PARTS)		
-72	211-0007-00			4	SCREW,MACHINE:4-40 X 0.188 INCH,PNH STL	83385	OBD
-73	210-0994-00			4	WASHER,FLAT:0.125 ID X 0.25" OD,STL	83385	OBD
					- - - * - - -		
-74	407-1172-00			2	BRKT,CKT BOARD:	80009	407-1172-00
					(ATTACHING PARTS)		
					- - - * - - -		
-75	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-76	210-0586-00			1	NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
					- - - * - - -		
-77	384-1194-00			2	SHAFT,EXTENSION,0.125 OD X 7.22 INCH LONG		
-78	376-0039-00	B010100	B019999	2	ADPT,SHAFT,CPLG:0.128 AND 0.082"DIA SHAFT	80009	376-0039-00
	376-0152-00	B020000		2	COUPLING,SHAFT,RIGID		
	213-0075-00			2	. SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	70276	OBD
-79	376-0125-00			2	. COUPLER,SWITCH:	80009	376-0125-00
					(ATTACHING PARTS)		
	213-0048-00	B010100	B061339	2	. SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
	213-0022-00	B061340		2	. SETSCREW:4-40 X 0.188 INCH,HEX SOC STL	74445	OBD
					- - - * - - -		
-80	376-0124-00			2	. COUPLER,SWITCH:	80009	376-0124-00
					(ATTACHING PARTS)		
	213-0048-00			4	. SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
	210-0940-00	XB061600		2	. WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
					- - - * - - -		
-81	----- -----			1	. RESISTOR,VAR.,(R1422/S1423A & R2422/S2423A)		
					(ATTACHING PARTS FOR EACH)		
-82	210-0583-00			2	. NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20319-402
-83	210-0046-00			4	. WASHER,LOCK:INTL,0.26 ID X 0.40" OD,STL	78189	1214-05-00-0541C
					- - - * - - -		
-84	129-0080-00			2	POST,4-40 X 0.875 INCH LONG		
					(ATTACHING PARTS)		
	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
	262-0965-00	B010100	B069999	1	SWITCH ASSEMBLY,ROTARY		
	262-0965-01	B070000		1	SWITCH ASSEMBLY,ROTARY		
	175-0826-00			FT	. WIRE,ELECTRICAL:3 WIRE RIBBON	08261	TEK-175-0826-00
	175-0827-00			FT	. WIRE,ELECTRICAL:4 WIRE RIBBON	08261	TEK-175-0827-00
	175-0828-00			FT	. WIRE,ELECTRICAL:5 WIRE RIBBON	23499	TEK-175-0828-00
-85	260-1493-00			1	. SWITCH,ROTARY(S30)		
					(ATTACHING PARTS)		
-86	210-0590-00			1	. NUT,PLAIN,HEX.:0.375 X 0.438 INCH,STL	73743	2X28269-402
-87	210-0012-00			1	. WASHER,LOCK:INTL,0.375 ID X 0.50" OD STL	78189	1220-02-00-0541C
					- - - * - - -		
-88	----- -----			1	CKT BOARD ASSY:AMPLIFIER(SEE A5 EPL)		
-89	131-0608-00			4	. CONTACT,ELEC:0.365 INCH LONG	22526	47357
-90	136-0252-04			162	. CONTACT,ELEC:0.188 INCH LONG	22526	75060
-91	214-0579-00			1	. TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-92	407-0553-00			2	. BRKT,CMPNT MTG:	80009	407-0553-00
-93	407-0912-00			1	. BRKT,CMPNT MTG:	80009	407-0912-00
					(ATTACHING PARTS FOR CKT BD)		
-94	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-95	386-1402-00			1	PANEL,REAR:	80009	386-1402-00
					(ATTACHING PARTS)		
-96	213-0192-00			4	SCR,TPG,THD FOR:6-32 X 0.50 INCH,PNH STL	87308	OBD
-97	361-0326-00			1	SPACER,SLEEVE:0.18 ID X 0.25 OD X 0.10"L	80009	361-0326-00
					- - - * - - -		
-98	220-0547-01			4	NUT,BLOCK:0.38 X 0.25 X 0.282"OA	80009	220-0547-01
					(ATTACHING PARTS)		
-99	211-0105-00			1	SCREW,MACHINE:4-40 X 0.188"100 DEG,FLH STL	83385	OBD
					- - - * - - -		
-100	105-0075-00			1	PAWL:0.475 X 0.21 X 0.184 INCH,PLSTC	80009	105-0075-00
-101	214-1054-00			1	SPRING,DETENT:LATCH	80009	214-1054-00
-102	214-1061-00			1	SPRING,GROUND:FLAT	80009	214-1061-00
-103	426-0736-00			1	FR SECT,PLUG-IN:TOP	80009	426-0736-00
-104	426-0737-00			1	FR SECT,PLUG-IN:BOTTOM	80009	426-0737-00
-105	337-1064-00			2	SHLD,SIDE,ELEC:PLUG-IN	80009	337-1064-00
	175-0825-00			FT	WIRE,ELECTRICAL:2 WIRE RIBBON	23499	TEK-175-0825-00
	175-0826-00			FT	WIRE,ELECTRICAL:3 WIRE RIBBON	08261	TEK-175-0826-00
	175-0828-00			FT	WIRE,ELECTRICAL:5 WIRE RIBBON	23499	TEK-175-0828-00
	175-0829-00			FT	WIRE,ELECTRICAL:6 WIRE RIBBON	83501	TEK-175-0829-00
	175-0831-00			FT	WIRE,ELECTRICAL:8 WIRE RIBBON	08261	TEK-175-0831-00
	175-0832-00			FT	WIRE,ELECTRICAL:9 WIRE RIBBON	23499	TEK-175-0832-00



7A26 DUAL TRACE AMPLIFIER

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Sections of the manual are often printed at different times, so some of the information on the change pages may already be in your manual. Since the change information sheets are carried in the manual until ALL changes are permanently entered, some duplication may occur. If no such change pages appear in this section, your manual is correct as printed.

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MANUAL CHANGE INFORMATION

PRODUCT 7A26
EFF SN B083790-up

CHANGE REFERENCE M22,494
DATE 9-25-74

CHANGE:	DESCRIPTION

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

A5	670-2549-03	AMPLIFIER Circuit Board Assembly
C1432	281-0122-00	2.5-9 pF, Var, Cer, 100 V
C2432	281-0122-00	2.5-9 pF, Var, Cer, 100 V

C1432 is added between pins 2 and 3 of U1450 located on diagram 2 CHANNEL 1 AMPLIFIER. C2432 is added between pins 2 and 3 of U2450 located on diagram 3 CHANNEL 2 AMPLIFIER.